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THE VOLUNTEER RIFLEMAN AND THE RIFLE.

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ICKE, 38, CAREY STREET,
NCOLN'S INN FIELDS.

1854.

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THE

VOLUNTEER RIFLEMAN,

AND THE

RIFLE.

BY

JOHN BOUCHER,

FORMERLY OF THE 5TH DRAGOON GUARDS, AND NORTH BRITISH RIFLES.

"In order to be of the slightest use in the time of danger, a volunteer should have confidence in himself, and in the weapon he carries."—HON. A. GORDON, *Assistant-Adjutant General.*

LONDON:
ROBERT HARDWICKE, 38, CAREY STREET,
LINCOLN'S INN FIELDS.

1854.

231. b. 34.

BIBLIOTHECA · BODLEIANA

PREFACE.

THE greater part of the following remarks were written for the use of the members of the HANOVER PARK RIFLE ASSOCIATION, PECKHAM, (SOUTH LONDON), to be circulated amongst them merely in a manuscript form ; but several military friends having suggested the propriety of publishing them for the benefit of others, I have been induced, with that object in view, and in order to render the work more complete, to enlarge on some subjects, and to introduce others, on which I was in the habit of commenting and giving instructions verbally.

The rifleman, who has a desire for greater knowledge in the art, not only requires a guide that will assist him in acquiring a correct use of his weapon, but he requires one that will facilitate the conception of the principles upon which such correct use is

founded. On the one hand, he requires practical directions rather than arguments; on the other, he requires facts rather than abstruse calculations. Such a guide I have endeavoured to supply; having introduced nothing but what is strictly in accordance with my own practice and belief.

There are many persons, I am well aware, who are much better qualified for the task than I am; but as no treatise has yet appeared in the English language, which lays claim to the name of a practical and scientific assistant to the young rifleman of the present day, I have ventured to commit this to the press, in the hope that it may become useful to many, and that they, in their turn, aided by additional study and experience, may become the instructors of others.

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That practical men, generally, do not understand or duly appreciate those principles, is but too evident. Into the causes of this, I shall not stop here to enquire. I allude to it, however, in order to impress it the more deeply on your minds, that, if you desire to bring your practice to anything like perfection, you must avail yourselves of the aids which science offers; and that if you wish to realise all the advantages which science is capable of placing within your reach, you must become acquainted with the connexion that exists between the scientific principles and the art.

Having particularly in view the instruction of those who are complete novices in rifle-shooting, I have endeavoured to explain, in clear and intelligible language, the principles which should guide them in their practice; and, as it is impossible to avoid occasional repetition—the explanation of one part naturally leading to the consideration of others attached to it—I have, in some instances, preferred telling my story twice to not telling it at all. My aim, however, being to convey the necessary information in as condensed a form as possible, I have introduced no more of the philosophy of the subject than seemed requisite to a clear understanding of the practice. I have also endeavoured to avoid as much as possible the use of technical phrases; or, where that was impossible, to explain them to the best of my ability.

CHAPTER I.

DEFINITIONS OF CERTAIN TECHNICAL TERMS, AS APPLIED TO THE GENERAL LAWS OF MOTION.

Body.—Density.—Force.—Motion.—Velocity.—Initial velocity.—Momentum.—Friction.—Inertia.—Gravity.—Centre of gravity.—Atmosphere.—Vacuum.—Rest, or Repose.

A BULLET on leaving the muzzle of any fire-arm, whether it has a smooth bore or a rifled barrel, makes a passage more or less short through the air before reaching the mark; for during the whole of its flight it is subjected to certain influences quite independent of the nature of the barrel from which it is projected; and these influences it is necessary to study in the first place, as we must take them into calculation in our method of using the rifle.

Before proceeding to do so, however, it may be requisite to explain the meaning of certain technical terms which will be used, as the use of them will be indispensable to the right comprehension of the subject.

Body, is the mass or quantity of matter in motion, or to be put in motion or acted on. By the mass or actual volume of a body is understood the quantity of material parts of which it is composed. The material parts are particles separated from one another by spaces termed pores. In proportion to the largeness or smallness of the pores, is the weakness or strength of the material parts. The space bounded by the exterior surface of a body is its apparent volume. A body that yields to pressure, and recovers its figure again, is called an elastic body; and one that will not do so, is named a non-elastic body. The gases which are generated by the combustion of gunpowder are elastic bodies; the astmosphere is also an elastic body. Lead is a non-elastic body, and from its density and softness, is peculiarly adapted for rifle bullets.

Density, is the proportion of the quantity of matter in any body, to the quantity of matter in another body of the same size. A body which, from its closeness of texture, or compactness, contains more matter than another, under the same bulk, is said to be denser than the other, and that in proportion to the quantity of material elements which it contains. A leaden bullet is, therefore, denser than an iron one, because a cubic inch of lead weighs more than a cubic inch of iron. The temperature has an influence on the density of the air; when it rises, the air dilates, its density diminishes, and the resistance it opposes to a bullet becomes weaker; when the temperature is lowered, the density of the air increases, and its

resistance to the bullet is greater. Every change in the temperature, by varying the density of the air, changes the form of the trajectory, as it elevates or depresses the bullet in its flight, and, consequently, lengthens or shortens its range.

Force, is a power exerted on a body to move it. The forces which have to engage our attention are those which have the property of impelling inanimate objects from a state of rest to a state of motion, of stopping them when in motion, or of altering the character of their motion. Forces are *instantaneous* or *continued;* the former is an impulse, like a stroke; the latter acts without intermission. When a continued force remains always of the same intensity, it is called a *constant* force. A force is said to be an *accelerating,* or *retarding force,* according as it produces an accelerated or retarded motion. These forces also produce various motions, accelerated or retarded, in an uniform or non-uniform manner.

Motion, is the changing of place, or the opposite of rest. The degree of speed in the motion of bodies is called velocity.

Velocity, is a property of motion, by which it passes over a certain space in a certain time, and is greater or less, according as it passes over a greater or less space in a given time. Velocity is either uniform or variable. Uniform or equal velocity is that with which a body passes over equal spaces in equal times. It is variable, or unequal, when the spaces passed over in equal times are unequal; in which case it is either accelerated or retarded velocity, and this accele-

founded. On the one hand, he requires practical directions rather than arguments; on the other, he requires facts rather than abstruse calculations. Such a guide I have endeavoured to supply; having introduced nothing but what is strictly in accordance with my own practice and belief.

There are many persons, I am well aware, who are much better qualified for the task than I am; but as no treatise has yet appeared in the English language, which lays claim to the name of a practical and scientific assistant to the young rifleman of the present day, I have ventured to commit this to the press, in the hope that it may become useful to many, and that they, in their turn, aided by additional study and experience, may become the instructors of others.

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thrice as much inactivity; that is, it will require twice or thrice as much force to give it an equal degree of motion, or to stop it after it has been put into such a motion.

Gravity, is the force wherewith a body falls down to the earth. The velocity of a falling body is uniformly accelerated in its approach towards the ground, if the resistance of the atmosphere be not taken into account, and this acceleration takes place in regular arithmetical progression, as follows:—a dense or compact body, when falling freely, passes through a space of $16\frac{1}{12}$ feet during the first second of time; during the first two seconds, it falls through four times as much as the first, or $64\frac{1}{3}$ feet; during the first three seconds, it falls through nine times as much as the first, or $144\frac{3}{4}$ feet, and so on, taking the square of the number of seconds, that is, the number multiplied by itself, in proportion, as 1, 4, 9, 16, &c.

This motion being also an *uniformly* accelerated one, a fraction of a second may be taken, that is, if in one fraction of a second a body falls a certain space, at the end of the two first fractions it will have fallen a space equal to four times the first; at the end of the three first fractions, it will have fallen a space equal to nine times the first, and so on, the degree or quantity of velocity being always proportioned to the length of the time.

That natural bodies are thus accelerated in their descent must be evident to every attentive observer, for we find that the greater the height from whence a body falls, the greater impression it makes on the object upon which it strikes. A

man may leap from a chair without sustaining any injury; but he could not do so from the house-top, for the increase, or acceleration of velocity, would endanger his life.

Centre of gravity, is that point within a body from which, if it be suspended, it will remain at rest in any given position. Every solid body, or dense mass, possesses a centre of gravity, that is, a point upon or about which the body balances itself, and remains in a state of rest or equilibrium in any position. In regular-shaped bodies, this centre is in their middle part; in irregular bodies it is determined from the point about which they will balance themselves, or settle in equilibrium.

Atmosphere, is the enormous mass of air in which we live. It is an invisible elastic fluid, and surrounds our globe far beyond the summits of the highest mountains. The oxygen which it contains especially promotes the combustion of bodies, as gunpowder, &c. Fire is active in proportion to the combustibility of the substances on which it acts, and to the quantity of atmospheric air which is afforded to it; a due quantity of air has, therefore, more to do with the proper effect of gunpowder than many are aware of. The atmosphere possesses the capacity of absorbing and sustaining moisture, and this, by rendering the atmosphere denser, more or less, affects the flight of bullets. A great number of facts prove the existence and materiality of the air, its weight, resistance, &c. Its resistance to the flight of a bullet is in proportion to the square of the velocity; for example: a velocity of 2000 feet per second causes a resistance four times

greater than a velocity of 1000 feet per second; a velocity of 3000 feet per second causes a resistance nine times greater than a velocity of 1000 feet per second, &c., so that, by increasing the velocity of a bullet through the air, we must increase the power in a greater proportion, in order to compensate the loss caused by resistance.

Vacuum. If we suppose that, by any method, we have been enabled to remove all the air contained in a given space, we say that a *vacuum* has been made in this space. Generally, in speaking of a vacuum, the total absence of the air from the place under consideration is presumed. A bullet moving in vacuo would pass over equal spaces in equal times until it struck the ground, as there would be no resistance from the atmosphere, but only the force of gravity acting on it. It is ascertained that if a bullet were fired through vacuum with different initial velocities, at the same elevation, the ranges would be to one another as the squares of the initial velocities: that is, if the velocity was twice greater, the range would be four times greater; if the velocity was thrice greater, the range would be nine times greater than the first, &c.

Rest, or repose, is the state of a body abandoned to itself, and not subjected to the action of any force. The resistance of the air, and the force of gravity, cause bullets once in motion to cease moving, or come to a state of rest; when their action on such bodies instantly ceases.

CHAPTER II.

ON THE GENERAL PRINCIPLES OF FIRING, AND THE MOTION OF PROJECTILES IN A VACUUM, AND IN THE AIR.

The line of fire or projection.—The line of metal or aim.—Point blank range.—The trajectory, or line of flight of the bullet.—Force of projection, or impellant force.—Force of gravity, or the earth's attraction.—Vacuum.—Parabolic curve.—The resistance of the air.

THE general principles of firing are based upon the relations of position existing between three imaginary lines, called, *the line of fire, or projection; the line of metal, or aim; and the trajectory, or line of flight of the bullet through the air.* These lines are often confounded one with the other, though they differ very considerably, and this difference increases as the range is greater.

By the *line of fire, or projection,* is meant the axis of the barrel indefinitely prolonged. It is the primary direction of the centre of the bullet; a direction which this centre would not cease following if the bullet were subject to the propelling force of the powder alone.

The line of metal, or aim, is a straight line passing through the centre of the bottom of the notch of the back sight and the top of the front one to the object aimed at. The line thus obtained is called the *artificial,* in opposition to the natural line, which passes through the highest points on the breech and muzzle of the barrel; and which is also called the natural point blank aim. In rifles provided with a tangent scale and moveable slide, a particular point blank range corresponds to each movement of the slide; the point blank range, therefore, increases when the slide is raised, and decreases when the slide is lowered; for point blank range, both in theory and practice, means nothing more than that the object fired at is at the point of intersection between the line of sights and the line of flight of the bullet. In order that the *aim* should be good, it is requisite that the two points determining the line of metal, and the object aimed at, should be in the same right line.

The trajectory, or line of flight of the bullet, is the curve described by the bullet in the air, in its course from the barrel to the object aimed at. As long as the bullet is within the barrel, the trajectory is almost identical with the line of fire, but as soon as it has cleared the muzzle, the trajectory diverges from the line of fire, and this divergence becomes greater the further the bullet is from the rifle.

The line of fire, or projection, and the *line of metal, or aim,* will be easily understood on reference to the diagrams; but the *trajectory,* or *line of flight* of the bullet, will require further explana-

tions as to the cause of the bullet being drawn downwards, and by what forces it is urged from its first direction, the line of fire, or projection.

A body impelled into a state of motion by any given force, with no obstacle to interrupt it, or attractive force to draw it aside, would move forward, as a matter of necessity, from its property of inertia, in a straight line for ever. A bullet, therefore, launched into space, and endowed with a certain velocity by the force of the powder in the barrel, would continue to move on in the same direction, and with the same velocity, if a new force did not change or destroy the effect of the first; and this is so with a bullet during its passage through the air; for it is subjected to three different actions, all working together at the same time, namely—

1. The Force of Projection.
2. The Action of Gravity; and
3. The Re-action of the Air.

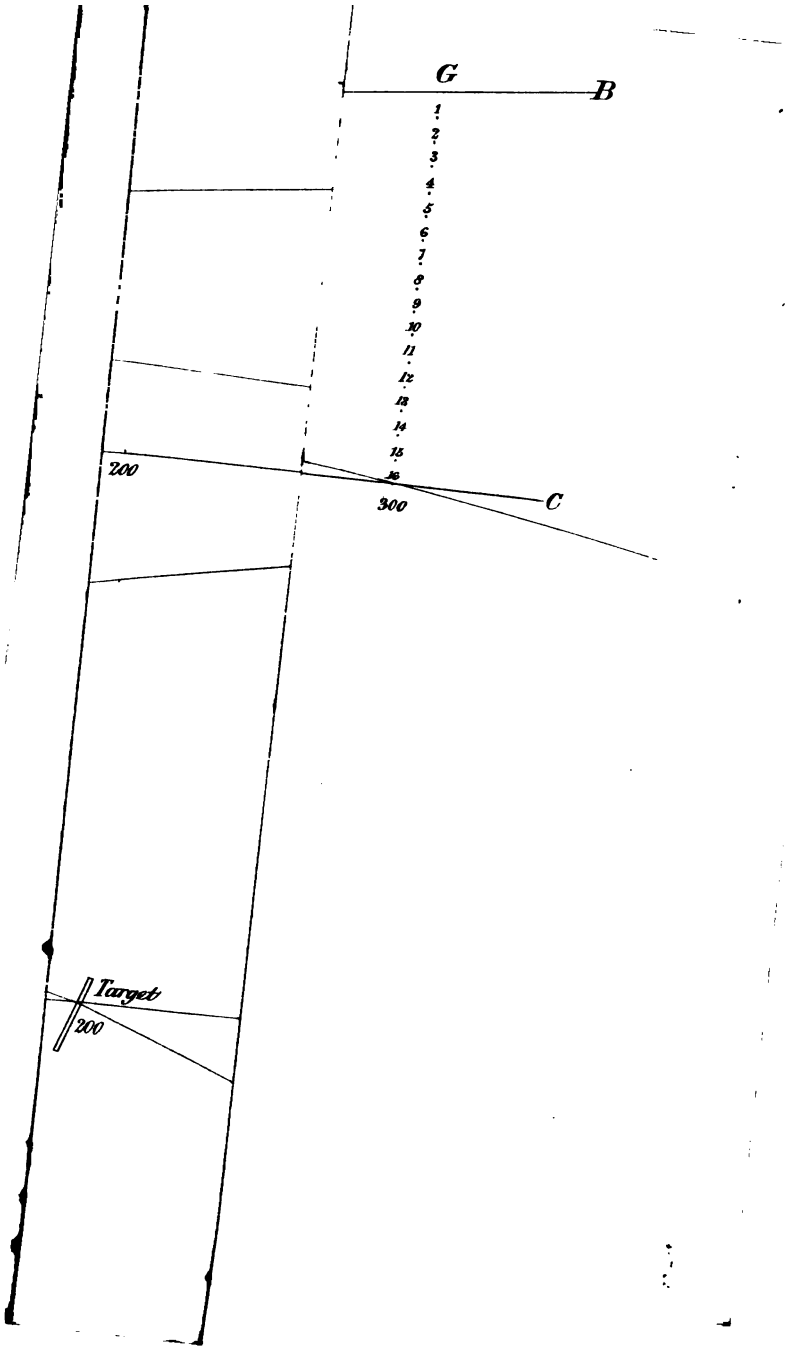
Now, in order to form a clear idea of the subject, let us suppose, for instance, that the path of the bullet through the air is subjected to the two first influences alone, viz.:—The impellant force, whereby the motion is first begun; and the force of gravity which urges it towards the ground; or, in other words, that it travelled through a vacuum.

The velocity of the bullet, at the instant it leaves the barrel, is called the *initial* velocity. The impellant force, or force of projection, would, therefore, urge it on in a straight line, at an uniform velocity with that with which it left the rifle; but the instant it leaves the barrel, gravity,

or the earth's attraction, commences work, and, during the whole time of its flight, is drawing it down towards the ground, and that with an *accelerated* velocity.

Suppose, then, that a bullet starting from A (Plate, fig. 1) with a velocity of, for instance, seventy-five yards per second, and following the direction A B, the line of fire. The line A B, as far as G, being marked off into four equal distances by D E F and G, representing seventy-five yards each, through which points the bullet would pass in one, two, three, and four seconds, if subjected alone to the force of projection. It must be evident, however, from what has been said on the force of gravity, that, by the time the bullet has reached the point D, it will have been attracted downwards a distance of one part; at E it will have been drawn down four parts; at F, nine parts; and so on until it has reached G, when it will have been drawn down to the horizontal line C, or point blank range, a distance of sixteen parts from the line of fire. This being at the end of each second according to the square of the number of seconds, that is, the number multiplied by itself, as I have already explained under the head of gravity.

By this we find that the bullet traces, while under the action of gravity and the projectile force, a peculiar curve, called a parabola. We also find that this curve changes its form in proportion to the extent of the initial velocity; for if the velocity be greater, the curve will be less bent, that is, it will approach nearer to a straight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line: but if the velocity be less, the curve, or path of the bullet through the air, will be more bent, that is, it will rise higher towards the centre. Thus it is that an alteration in the elevation of the rifle, or original direction of the bullet, modifies the form of the curve; for, with a weak charge, you require to elevate the muzzle of the rifle, and with a strong charge, you require to depress it, in order to hit the same mark. All the different curves, however, which are traced by a bullet moving through space, are called parabolas, or parabolic curves.

By tracing a diagram similar to Fig. 1, but with a higher elevation, or line of fire, A B, and another with a lower elevation, you will find that, although the curve in the one will be more bent, and in the other nearer a straight line, by drawing a perpendicular line from E down to the 150 yards, you will divide each curve into two symmetrical parts; that is, if the plane containing the curve be bent back, taking the perpendicular line as the hinge, that portion of the curve lying on the right of E will exactly coincide with the portion of the curve situated on the left, and this will be found to be the case whatever the elevation may be.

What has been said, however, is to be understood of projectiles moving in a non-resisting medium; for when the resistance of the air is also considered, which is enormously great, and which very much impedes the first projectile velocity, the path deviates greatly from the parabola, and the determination of all the circumstances of its

motion becomes one of the most complex and difficult problems in nature.

The re-action, or resistance of the air, being the third influence to which the bullet is subjected, must now be taken into account.

When a moveable body is launched into space it meets particles of air at every instant of its movement, to which it yields part of its velocity, and, as the resistance of the atmosphere is a constant force, the velocity of the bullet decreases every instant from the commencement of the motion to the end. The speed of projection, or initial velocity, therefore, cannot be maintained the same in the atmosphere as in a non-resisting medium, for the resistance of the air incessantly diminishes the velocity, and the curve represented by the bullet can no longer retain the true parabolic form, since the distances A D, D E, E F, and F G, through which the bullet passes in a second of time each, instead of remaining equal, must be progressively shortened, and the trajectory raised in proportion to the range of the bullet; see Fig. 2.

Thus at leaving the muzzle of the barrel A, the bullet, endowed with its greatest velocity, will yield but little to the resistance of the atmosphere, and apparently but slightly to the action of gravity; for at D, the end of the first second of time, the curvation of the trajectory will be very trifling. After another equal interval of time at E, the bullet having lost a portion of its first velocity, in consequence of the atmospheric resistance, gravity will have drawn it down four times

as far as it had done during the first second of time before it has passed a space in length equal to the first, having only arrived in this interval at the point marked 120 yards; and the curve, which the bullet will describe in this second interval of its motion, will generally possess a more marked curvation. After a third equal interval of time, F, the bullet having lost a still greater portion of its first velocity, in consequence of the continued resistance of the atmosphere, gravity will have drawn it down nine times as far as it had done during the first second of time, A D, before it has passed a space equal to the second, D E, as it will only have reached the point marked 159 yards, and in this third interval the curve will possess a still greater curvation; and the greater will this curve be the nearer it is to the target or surface of the earth, as may be seen on reference to the diagram, Fig. 2, which I have carefully drawn from actual measurement made on the field.

This was accomplished by placing screens, made of tissue paper, of from two to three feet square each, at every twenty-five yards, just above the line of aim, and then firing from a rest direct at the bull's eye. From the rest to the spot where the bullet struck, a horizontal line was formed by marking it off under each screen; and from this line the distance was measured to the spot where the bullet passed through each screen, on its flight to the target. The length of the paper will not admit of the extent of the range, and height of the flight of the bullet, being drawn in correct proportions to one another; but, in the trajectory,

I have given the relative height of the bullet at every twenty-five yards; the highest point of flight being twenty inches above the line of aim, and that a little in advance of the 125 yards. As rifles, from a combination of circumstances alluded to elsewhere, do not all shoot alike strong, the height of their trajectories will not always be the same.

For the space of 200 yards it is comparatively easy to make a diagram of the flight of a bullet through the air; but the determination of the flight of a bullet through a non-resisting medium becomes a much more difficult matter; the diagram, Fig. 1, must, therefore, only be taken as an approximation, sufficiently close, however, to give a general idea, comparing it with Fig. 2, of how much a bullet is retarded by the resistance of the atmosphere.

Hutton, the celebrated mathematican, found, by experiments, that the resistance of the air amounts to near 100 times the weight of the bullet, viz.: when it moved with a velocity of 2000 feet per second; and as bullets sometimes move with a velocity of from 2,500 to 3000 feet per second, on leaving the muzzle, the resistance of the air may be easily conceived to be much greater; as the resistance of the air increases or diminishes according as the velocity of the bullet increases or diminishes. D. Bernoulli, another eminent mathematican, proved that a ball that ascends only 7,819 feet in the air, would have ascended 58,750 feet in vacuo, being nearly eight times as high. With such facts before us, it need not be difficult to understand why the trajectory in Fig. 1, is so much

lower and longer than in Fig. 2, although both are but approximations, the length of the paper not permitting me to give the real proportions.

In fact, all experiments agree in proving that the air offers very great resistance to the swift motions of military projectiles, and that the track described in the atmosphere, by the flight of even the heaviest shot, is not a true parabola, nor anything near it, except when they are projected with very small velocities. This cannot, for a moment, be doubted by any one who, in a proper situation, views the flight of stones, arrows, or even shells, thrown to any considerable distance; for they are seen to descend through a curve manifestly shorter and more inclined to the horizon than that in which they ascended, and the highest point of their flight, or vertex of the curve, is much nearer to the place where they fall on the ground, than to that from which they were at first discharged.

CHAPTER III.

ON THE KIND OF GUNPOWDER BEST ADAPTED FOR RIFLE SHOOTING.

Ignition and Combustion.—Gases produced.—A gradually increasing impulse necessary.—Quantity.

I SHALL now introduce the subject of gunpowder, as upon that is based the whole of our present study. With regard, however, to its origin, history, and manufacture, on that part of the subject I shall not enlarge, as you can easily refer to it in other works, if you be so inclined. My remarks will, therefore, be confined to its character and effects, so far as the rifle is concerned.

It is a very common, though erroneous opinion, that very fine-grain powder is necessarily the strongest, and, as a matter of course, the best adapted for rifle-shooting. Nothing can be further from the truth, and the reason I shall endeavour to explain.

If you place a charge of powder on a board and touch it with a red-hot iron, it will explode so suddenly as to appear a simultaneous burst of flame;

but, correctly speaking, it is not so, but merely the rapid ignition and combustion of all the particles; for a portion of time must necessarily be occupied by the flame—however short that portion of time may be—in travelling from the first grains to the last.

The difference of time in the explosion of a charge of fine gunpowder, and that of one of a larger grain, will not be perceptible to the eye; but still there is a difference; for a single grain of fine powder will take less time to consume than a larger grain: supposing that both are formed of the same ingredients, and are of the same density and hardness; the difference of time, in burning, being in proportion to the difference between the size of the grains; as both will burn equally quick to the core.

The terms *ignition* and *combustion*, although closely connected, must here be distinctly understood as having a different meaning. The ignition of powder takes place from grain to grain, and is communicated, in the generality of cases, with the greatest rapidity to all parts of the same charge; but the combustion takes place in the interior of each grain.

When fire has been communicated to the charge by the nippled vent, all the parts of the charge are not ignited simultaneously, as had been for a long time believed, but successively, for only a portion of the powder is at first inflamed. As the combustion proceeds, the powder is decomposed, and produces gaseous and solid bodies; and, as the gaseous parts have a tendency to fill a much

larger space than that occupied by the powder before inflammation, they seek an outlet where there is least opposition. This outlet is the place occupied by the bullet; the gases, therefore, act forcibly on it, and compel it to exchange its state of rest for one of a very rapidly increasing motion; as it is not until the bullet has traversed a considerable portion of the bore of the barrel, that it is subjected to the greatest action of the powder, by the accumulation of the gases. This propelling force, increased by the successive inflammation of the other parts of the charge, thus acts upon the bullet with a continually increasing urging force, and continues to do so *(if the quality and quantity of the powder, and the barrel, have a right proportion to each other)*, until just before it leaves the muzzle, when it is at its greatest velocity.

The larger the grains, the more easy will it be for the gas produced by the combustion of the first grains to spread through the whole extent of the charge, in consequence of its having a lesser number of interstices, or paths, for the flame to travel through; but in this case the combustion will be comparatively slow on account of the larger size of the grains. On the other hand, very fine powder, while rendering the ignition slower, in consequence of the greater number of paths the flame has to travel through, will cause very rapid combustion on account of the smallness of the grains, creating an almost instantaneous explosion; but this very quickness, as we shall see, is its worst recommendation, as far as rifle shooting is concerned.

The explosion of fine-grain gunpowder being so rapid, the expansion of the gases is so quick, that the whole power is generated and has reached its highest point before the bullet can be much more than half way out of the barrel, leaving it without any increasing propellant power, than that which has been already generated, to contend with the column of air in the remaining part of the barrel, which must be condensed before the bullet can leave the muzzle, and which causes at the same time a very dangerous recoil. The consequence is that a high speed is quickly generated, to be again quickly reduced to a lower velocity by the opposition of the air in the other part of the barrel, as well as by the friction of the bullet. It is in fact too quick to be beneficial; it kicks the bullet, as it were, out of the barrel, and does not communicate to it the momentum which the bullet would otherwise receive, if the impulse were graduated.

This graduated impulse may, however, be obtained by using a powder of a larger grain, for as it does not explode so rapidly, it would generate a power, expanding from breech to muzzle, increasing the velocity of the bullet on a graduated scale by the accumulation of the powder gases, until it obtained the highest, or maximum, velocity as it left the muzzle; for the duration of the explosion, or the period during which a continuous generating of force is obtained, is dependent upon the size or quantity of matter in each individual grain, and, therefore the combustion of the whole quantity will be lengthened or shortened, as the grains are larger or smaller.

As very fine powder is too quick to be beneficial, unless in very short barrels, you may, on the other hand, make a mistake by selecting powder of too coarse a grain for the length and calibre of your barrels; as all the force it is capable of generating would not have reached its highest point before the bullet had left the muzzle; and consequently, a part of the powder would be expelled without being consumed.

The great object, therefore, is to select such a powder as will be best suited to the capacity of your rifles; and this can only be accomplished by selecting one that, as I shall presently show, will have generated all its explosive force, and created its greatest power, just as the bullet is leaving the muzzle of the barrel; for the great principle in a propellant force, is to arrange it so as not to obtain too great a velocity at the first move of the bullet; for, as philosophy and experience both teach us, a body cannot be forced from a state of rest into a high state of motion in an instant, as it were; but a portion of time must elapse, however short that may be.

The manufacturers of gunpowder have now for some time been in the habit of preparing a powder specifically for rifle practice, which is known in the shops as rifle powder. And as all barrels have a size of grain, and quality, that will suit them best, one of these powders may be better suited for yours than the others. In order to prove this, the best way is to procure a small quantity of each, and give them a fair trial by firing, from a rest, a dozen rounds, or more, out of each parcel, on dif-

ferent days, so that the rifle may be in a proper state of cleanliness on each occasion. In firing, take your stand, say at 300 or 400 yards from the mound or butt against which you fire, and with the 200 yards' sight aim at the bull's eye, so that the bullets may strike the ground before they reach the target. The marker, who may be standing on one side sufficiently out of danger, can then run across and place marks where the bullets strike; to enable you, when the firing is over, to measure the ranges, and enter them in a memorandum book, with a note of the state of the atmosphere, for the purpose of comparison; and whatever powder causes the bullets to range farthest, may be considered as having the greatest propellant power in proportion to the capacity of the barrel, and, therefore, the fittest for your use.

With regard to the quantity of powder for each charge, that can only be regulated by experience. It must be sufficient, but not superabundant, for it is easily proved that beyond a certain limit, different in rifles of different proportions, the increase of the charge has a bad effect on the precision of the fire, and range of the bullet. It is, therefore, of importance to determine for each rifle, a charge in proportion to its length and calibre; and this proportion will be governed by the size of the grain and quality, and the resistance offered to its expansion by the *vis inertia* of the bullet; as no more than a certain quantity can be *effectively* consumed in any rifle. In fact, the best amount for the charge will be found to be the *least* quantity which sends all the bullets *farthest*

and *nearest* to one point; or, in other words, which keeps them *closest* together. When you have, by repeated experiments, ascertained what sort of powder, and what amount of charge, is the best calculated to effect this, adhere to the same on all occasions, especially when competing for prizes, as you will then know what you have to depend upon, when a trial of skill takes place.

CHAPTER IV.

ON LOADING, PRESENTING, AND TAKING AIM.

Rules to be attended to on arrival at the ground, and during Ball Practice.—"Carry Arms."—"Prepare to Load."—"Load."—Remarks on Loading.—"Order Arms."—"Stand Easy."—"Shoulder Arms."—"Ready."—Remarks on presenting and taking aim.—"Recover Arms."—"Right Face."—"Lodge Arms."

In order to preserve a soldier-like demeanour, as well as to prevent accidents, the following rules will be attended to at all meetings for ball practice:—

1. On the order being given, the gentlemen will "fall in" in single rank, with arms "carried," about six paces in rear of the firing line, and "size" from right to left, or from flanks to centre, according as the order may be given.

2. The names of the gentlemen will be entered on the target card, in the order in which they stand in the rank, commencing from the right.

3. The command "prepare to load," and "load," will be given; and, after loading, the gentlemen

will "stand easy" with their rifles at the "order." In this position they will be permitted to converse with one another, but on no account to make reflections on any shot.

4. On the first number being called, the gentleman will "shoulder arms" and advance to the firing line, and on the word "ready" being given, he will "cap," "present," and "fire," without any further order, and then return to his place in the rank, and load again.

5. In order to save time, the next in rotation will advance to the firing line, without waiting for his number being called, and there remain, with arms "shouldered," until the word "ready" is given.

6. One or two preliminary shots will be permitted to be taken previous to commencing the regular practice; and any gentleman will be allowed, during practice, to see the state of his score; but he must do so before he re-loads, and then return immediately to his place in the rank.

7. A shilling forfeit, to the marker's and medal fund, shall be incurred for every breach of any rule; and the payment of all forfeits will be rigidly enforced.

8. These rules to be in force on practice days, from the time the words "fall in" are given, until ordered to "recover arms," "right face," and "lodge arms," the signal for dismissal.

In "falling in" to your places in the rank, you do so with rifles "carried," that is, the rifle in the right hand at arms length, the guard between the thumb and forefinger, the other three fingers below

the cock, the upper part of the barrel close in the hollow of the shoulder, with the thumb of the right hand pressing against the thigh, and the left arm hanging close to the side.

In this position the command "prepare to load" is given, which is performed in three motions, as follows:—1st. Bring up the left hand and grasp the rifle in a line with the shoulder. 2nd. Bring the rifle down with the left hand, at the same time grasp it with the right hand between the sword-bar and the left hand; turn the barrel outwards, and place the butt so as to rest close inside the heels; the muzzle should be in a line with, and about six inches from, the centre of the body. 3rd. Bring the right hand to the cartridge pouch, or powder flask; at the same time shift the left hand close up to the muzzle of the rifle.

In loading the rifle, it would be now very unwise to attempt to do so by certain words of command, as formerly; such as, "load," "draw ramrods," "home," and "return ramrods;" as the very greatest care is necessary in loading to render a correct aim of any avail. The word "load" is, therefore, alone given, and this is done as follows:—Bring the cartridge, or powder flask, to the muzzle, and pour the powder into the barrel; then take a patch and place it fairly on the muzzle; and on this place a bullet, conical end uppermost, and press it with the finger and thumb into the barrel.

In the army, the instructions are to "bring the cartridge to the mouth, and bite off the twisted paper at the end;" but this plan will not do for

you, if you wish to make fine shooting; for, in so doing, some of the powder is often lost; the bad effects of which I shall explain to you as we proceed. If your powder is made up into cartridges, instead of biting off the twisted paper, use both hands and *open* each carefully, resting the muzzle of the rifle on the wrist of the left hand while you are doing so.

After having seated the bullet in the muzzle of the barrel, draw the ramrod half out with the second joint of the fore-finger and the thumb; then grasp it near the muzzle and draw it quite out and place the lower, or cup-formed end on the bullet, guiding the end of the ramrod with the fore-finger and thumb of the left hand: bend the legs so as to catch and support the rifle between the knees, and, with *both* hands, press the bullet gradually and steadily down until it reaches the powder. This may be done with one hand, supporting the rifle with the other, the knees straight; but it cannot be done so steadily; or with so little harm to the bullet; I therefore strongly recommend the use of both hands in pressing down the bullet.

Having pressed the bullet down until it has reached the powder, you again grasp the muzzle of the barrel with your left hand, stand upright, draw out and return the ramrod to its place, and then seize the rifle with the right hand below the left; turn the rifle, guard to the front, and, with the right hand, move it to the right side, placing the butt on the ground, close to and in a line with the toes, the wrist pressed against the side with

the elbow close, and the left arm brought quickly to the left side. You are now in the position in which you would be expected to place yourselves, if the command "order arms" was given.

Being loaded, you may now "stand easy," that is, you may move your body, and converse in an under tone with one another; but you are on no account to make any reflections on the shooting, as such conduct is sure to distract the attention of any one who may be in the act of taking aim.

As your numbers are called, you "shoulder arms" by throwing the rifle by a jerk of the right hand, into the hollow of the right shoulder, catching it at the same time with the left hand near the second pipe, till the right hand has embraced the guard, as when "carried;" the left hand is then brought quickly to the left side. In the performance of this, as well as in every other motion, the greatest care should be taken to prevent the rifle from falling to the ground, as a good one is a somewhat delicate instrument; efficient when treated with care, but easily damaged if placed in clumsy hands.

With your rifle "shouldered" you now advance to the firing line, and at the word "ready" you make a "half face" to the right, grasp the rifle with the left hand near the lower sight, and bring it down into a horizontal position, with the muzzle pointing to the target; place it on half-cock with the thumb of the right hand, and remove the old cap if the rifle has been recently discharged; place a cap on the nipple, and press it gently but firmly down with the thumb; then, with the fingers

behind the guard, put the rifle on full cock with the thumb of the right hand, and grasp the small of the butt by placing the thumb round it; fix the eyes steadily on the object, or bull's eye, and move the right foot back twelve or fourteen inches farther from the target in a diagonal line towards the right; the right toe pointing to the right, and the left toe towards the target, with both knees straight; raise the rifle slowly until in a line with the object your eyes have fixed on, moving your left hand well forward, but not so far as to occasion any inconvenience in the posture; the rifle resting on the centre of the hand, and not held merely with the finger ends, the thumb stretched along the stock, and the butt in the hollow of the shoulder. The left elbow should fall naturally, without awkwardness, but if the left hand holds the rifle properly, the elbow will be found to be properly placed without causing you to take any trouble about it.

The rifle being placed against the right shoulder, the cheek should be placed on the stock nearly parallel to the wood work, with the head a little bent forward. In this position particular care must be taken to shut the left eye and, in taking aim, to look along the very centre of the bottom of the notch of the back sight, and the top of the front one, to the object aimed at; and the instant you feel satisfied that you have correctly covered the object, *press* the trigger with the fore-finger.

Too much pains cannot be taken to prevent the rifle from being raised with a jerk, and putting the finger on the trigger before it is at the

shoulder; it ought to be deliberately raised, at arms length, until aligned with the object that the eyes have fixed on, and without too much stooping of the head; for if the body is much bent forward, you will neither stand so easy nor so steady; and, for this purpose, both heels should be planted firmly on the ground before beginning to raise the rifle.

After firing, "shoulder arms," "right about face," and return to your place in the rank, and load again.

When the specified number of rounds have been completed, and the firing over for the day, the word "attention" will be given, on hearing which you must stand at the "order" as already described. The command "shoulder arms" will then be given; and then "recover arms," which is performed as follows:—1st. Bring the left hand smartly across the body, and grasp the rifle under the top swivel, embracing the sling. 2nd. Raise the rifle perpendicularly with the right hand; at the same time slide the left hand down, inside the sling, until within two inches of the lock plate; the guard turned to the front, the cock resting against the left breast, and the right hand grasping the small of the butt.

The order "right face" will then be given, followed by "lodge arms," which is done by dropping the rifle diagonally across the body, turning the lock to the front, at the height of the centre of the breast; the barrel crossing opposite the point of the left shoulder, the butt proportionately lowered, elbows close, and both thumbs

pointing to the muzzle. This is done as one motion; and then (if formed in two ranks) the front rank take a pace to the left, and the rear rank a pace to the right, break off, and quit the ground.

CHAPTER V.

REMARKS ON LOADING, CONTINUED.

The Charge.—The Patch.—The Bullet.

On the subject of loading I shall now make some further observations, as the method of doing so correctly and properly is of the greatest importance. A uniform quantity of powder for each separate charge should be strictly adhered to at all times; great care should, therefore, be taken in the measurement, that it be always the same quantity, and that the same amount of charge be used at all distances. If the charge is not correctly measured, or any portion of the powder be lost, a corresponding difference in the range will be the result; you should, therefore, if a cartridge, use both hands in opening it; the muzzle of the rifle resting at the time on the wrist of the left hand. If you use a powder flask, see that the charge be always equally full, and that the flask be not shaken more at one time than another in filling the charger.

Some riflemen are so very particular as to weigh each charge separately; placing the powder

in paper tubes, containing one charge each; but unless you were as nicely particular with regard to the bullets, patches, and all the manual operations connected with loading, this plan would not be attended with much advantage to you; and a small brass or tin tube, as a separate charger, may, with proper care, be used with sufficient accuracy in its stead. The tube would certainly be a superior plan to that of using the common powder flask; for, unless you are particularly careful, you may easily make a difference, by the shaking of the flask and the pressure of the forefinger, sufficient to cause an error of a foot or more vertically, according to distance, in the flight of the bullet. Of the truth of this you may easily satisfy yourselves. Take the powder flask and place your finger *gently* on the mouth of it, *shake* the powder well into the charger, and then turn it out upon a piece of paper. Measure another charge, but press the finger *firmly* on the mouth of the charger, and let the powder run into it with *little* or no shaking; turn it out as before, and weigh each charge carefully in a pair of small scales. The result will show that the *shaken* one is the heaviest; the particles having been shaken down closer together; consequently, if the heaviest one is in proportion to the capacity of the barrel, it will propel the bullet with greater force, and cause it to strike the target higher than the other charge, which being less in weight, will have power to do.

I may here remark that the mouths of powder flasks, generally, are much too wide, as they allow too much of the finger to be pressed in, thereby

very materially, and, as I have shown, irregularly, interfering with the correct measurement of the powder. In a windy day, some of the powder is also more apt to be blown away from a wide-mouthed flask in the act of loading.

In using a separate tube as a charger, the best plan is to fill it from the powder flask until it is heaped a little; then draw the edge of the flask across the mouth of the charger, so as to strike off the heaped up particles. By this means you will leave the charger *level* full, with no pressure or shaking.

When the powder is poured in, put the greased patch on the end of the barrel as near the centre as possible; as great care should be taken in having the bullet in the very middle of the patch before pressing it down the barrel; for if the patch be more on one side than another, it will give the bullet an inclination, and throw it from the straight line on its leaving the barrel.

A uniformity in the thickness and size of the patches is also of great importance. Those sold in the shops are marked with the substance and size on each box; so that there need be no great difficulty in procuring the same sort at all times; but if you make your own patches, you should be careful to purchase stuff of the same evenness in texture; and after having cut them with the punch, to pick out and throw away all that may be deficient in shape, or uneven in substance.

In the act of pressing the bullet down, with the finger and thumb, the edges of the patch will turn up. If it then appears more on one side than

another, take the bullet out and replace the patch with greater care; for, if the bullet is rammed down with more of the patch on one side than another, it will be rammed down crooked, and prevent its axis from coinciding with the axis of the barrel, and, consequently, be made to fly irregularly, whether everything else be right or not. The more the bullet is of the conical, or sugar-loaf form, the more will this irregularity of patching affect it.

The bullet should never be so large as to require much force to ram it down, nor yet should it be too easy; but, with its patch, it ought to fit air tight, or it will not have the desired effect. When a bullet happens to be so large as to require hammering to force it down, draw it at once and throw it away, as a bruised bullet will have ragged edges which will cause it to be much impeded, as well as thrown from its true direction, by the action of the air. When you see any one hammering a bullet with his ramrod, you may safely set him down as being in perfect ignorance of the harm he is doing, or indifferent as to the result. If the bullet be too small, its range will be less in con sequence of a portion of the power of the charge having been permitted to escape in gas between the bullet and the barrel; its true direction will also be affected, either vertically or horizontally, by its being made to lean more to one side of the barrel than another, in the act of loading.

Some riflemen weigh all their bullets separately, and distinguish them into two or three classes: those of which the greater quantity are of an equal

weight, are reserved for fine shooting, and the others are put by themselves for common practice. This is a very good plan; for otherwise, the very best aim may prove at times of no avail, in consequence of some hidden defect in the bullet; for if a part be hollow, the centre of gravity will not be in the line of the axis, and, consequently, its true line of flight will be more or less disturbed.

A very common fault, but a most serious one, is, the placing the bullets down upon the charge of powder lightly at one time, and jamming them down hard at another. This thumping, ram-jam system not only injures the strength of the powder, but it most materially affects the flight of the bullet; for it alters its shape, and, thereby, produces resistances from the air, which cause deviations both vertically and horizontally. It also causes variations in the range; for the initial velocity differs, according as the ramming is more or less violent. By ramming down too hard, besides altering the shape of the bullet, the grains of powder are crushed up, a certain portion is mealed, the due quantity of atmospheric air necessary for thorough combustion is forced out; a greater escape of the propellant gases takes place by the nipple, and, consequently, the strength of the charge is greatly diminished. Those who wish to become good shots, should, therefore, habituate themselves to ram home *uniformly;* they should follow the bullet, by a steady pressure of the ramrod, to the bottom; then assure themselves by a moderate pressure, that it rests upon the powder, and that it does so as nearly alike, every time, as possible.

Some recommend naked bullets dipped in grease, and just fitted so as to go down easily on to the powder, as the best mode of loading; but I object to such a plan for several reasons. In using bullets without patches, the sides of the barrel become extremely foul, especially in damp weather, and in pouring the charge in, a portion of the powder will adhere to the sides, and in the grooves of the barrel, which occasions a diminution in the range, and compels an elevation of the aim, which would not be required if this fouling did not exist. As you proceed in your firing, a horizontal deviation will also be occasioned in consequence of the accumulation of filth in the barrel; it also remarkably increases the recoil and the friction of the bullet against the sides of the barrel, and causes variations in the initial velocity. By using a proper sized patch, the grooves of the rifle become almost air tight; the filth from the old charge, as well as any loose particles of the new one, are carried down upon the rest of the charge, and the barrel is thus preserved clean, and the charge regular and equal in quantity at all times.

The patches I use are always greased when first prepared; but, when using them, I rub each patch on a little grease, which I keep in the lid of the patch box. The grease is made of four parts of hog's lard, and one part of bee's wax, melted and mixed together, which can be kept in a small jar, for supply at any time.

CHAPTER VI.

REMARKS ON TAKING AIM, CONTINUED.

Targets.—How to prevent Accidents.—Sights.—Preliminary Practice.—Snapping Caps.

As the art of taking a correct aim is not to be attained without considerable practice, I shall here continue my remarks on that subject, and lay down further rules for your guidance.

I have already mentioned that in taking aim, "the left hand should be well forward, but not so far as to occasion any inconvenience in the posture;" the proper place for the left hand will very easily be ascertained, by the facility with which you will be able to keep the rifle most steadily to the shoulder, so as to preserve it from drooping at the muzzle. The right hand, with the exception of the forefinger, should hold the rifle, clasping it below the trigger guard, and should also press the butt firmly to the shoulder, being assisted in steadying it, in a vertical position, by the inner part of the right arm; and, as the true flight and force of the bullet greatly depends on the

rifle being held firm to the shoulder; it is indispensibly necessary to press it firmly against the shoulder, and, at the same time, to *resist* as much as possible, but steadily, with that shoulder; for the more this steady resistance is persevered in, the less will be the recoil, and, consequently, the greater will be the velocity of the bullet and its range, as a certain amount of propelling force is lost, in proportion as the rifle is permitted to recoil. It should, however, not only be held firm, but at *all times* with an equal degree of firmness, until the bullet has left the barrel; and, if possible, for two or three seconds after; as, by so doing, you will sooner habituate yourselves to the necessary degree of steadiness, which is absolutely required.

If the butt of the stock is not held in a vertical position, the sights will be inclined to the right or left, which is a fruitful source of bad shooting, especially to new beginners; as some are liable to hold it so more at one time than another. If the rifle is not held with the sights perfectly upright, the axis of the bullet will not be coincident with the line of aim, and will, therefore, as a matter of course, strike the target on the right or left, according as the rifle is canted.

When the rifle is brought up sufficiently high, the cheek should be steadily placed on the stock, with the eye like a fixture, in a line with the sights, so that when brought up to the point intended, the cheek will require no alteration; for if it does, you will most likely lose the point and be much deceived. At very long distances you will

not be so able to apply this rule to practice, in consequence of the greater elevation of the back sight, but the practice of it at shorter distances, say up to four or five hundred yards, according to the bend of the stock, will beget a steady and uniform habit of holding the head, which will be of the greatest benefit to you at all distances. At long distances the arms will have to be depressed in proportion as the back sight notch is elevated, but, in other particulars, you must retain the prescribed position. At very long distances you will only be able to rest the heel of the butt against the shoulder.

When the rifle is brought up, that part of the forefinger, between the first and second joints, should be placed lightly on the trigger, and the instant your eye has covered the object in a correct line with the sights, hold your breath and press your finger on the trigger, without any jerk or movement of the rest of the hand or elbow; as the motion of the chest in breathing, or the movement of the hand or elbow, will be communicated to the rifle, and very materially disturb the line of aim, however well determined it might be before the pressure of the finger took place. The fixity of the right eye when the cock falls on the nipple, is an almost certain proof of the complete immobillity of all the rest of the body.

The action of letting the rifle off will be greatly facilitated by placing the forefinger quite at the lower end of the trigger. If it is hard to pull, it will require a violent effort to cause the cock to strike the nipple; and in consequence of this

exertion, the rifle and the body will lose their immobility, a condition indispensible for firing with precision. The trigger which requires *pulling* is not fit for any one who wishes to become a good shot; *pressure* alone ought to be sufficient if the lock is well made; this, therefore, ought to be particularly attended to when making a purchase, or giving an order.

When you have brought the rifle up to the "present," and have placed the cheek on the stock, with the eye in a line with the sights, do not aim at once at the bull's eye, but begin a little below, say at the bottom of the target, and, with the left hand, gradually raise the muzzle straight up; and at the instant the front sight covers the centre of the object to be hit, *press* the trigger. If you took your aim, in the first instance, direct at the bull's eye for any portion of time, a wavering or trembling will take place, and when discharged, the bullet will just as likely hit to the right or to the left, as centrally, and be, comparatively, a bad shot; but *so long* as you continue gradually to raise the muzzle straight up, no other movement, either to the right or left, can take place; you would, therefore, if you did not hit the bull's eye, most probably hit a little above or below it, and make, comparatively, a good shot, according to our method of scoring.

The target we generally fire at is six feet square; divided into three compartments two feet wide each, so as to represent three men. These are again divided cross-ways into three, making in all nine squares of two feet square each. In

the centre is the bull's eye, six inches in diameter; if you hit this you score ten; if you hit any part of the centre square it counts eight; the upper square of the centre compartment counts seven, and the lower one counts six. The outer compartments are comparatively bad shots, and count less, the centre square of each counting three, the upper square two, and the lower one. Thus you see, if you hit to the right or left you would only score three, or perhaps only two, or one; but if your hit was vertically central, if you did not strike the bull's eye, you would at all events score an eight, a seven, or a six; making sure to hit a man somewhere, if standing in the same situation.

In order to ascertain who makes the best shooting in the first class, the squares of the target are reduced to one foot, or six inches, each; and a similar relative value given to each square.

Some who profess to write instructions for riflemen, say, that at 200 yards the practice should be at a single target (six feet high and two feet wide); at 300 yards, it should be at two targets; at 400 yards, at three targets; at 500 yards, at four targets; at 600 yards, at five targets, &c., placed side by side. Now I should never advise this plan, but rather reverse it, if it were possible; at all events, if I increased the target in width, I would also increase it in height, so as to preserve the square; for those who know anything at all about correct firing, must know that, at 600 or 700 yards distance, a shot may pass a little over a target (six feet high), and still be, comparatively,

a good shot; whereas, a shot striking the outside target of five or six, placed side by side, must be considered, comparatively speaking, a bad shot; as right or left shots are always considered inferior to shots which strike a little too high, or a little too low.

If, by holding the rifle too long presented at the object before pressing the trigger, you feel that the wavering or trembling, to which I have alluded, has taken place, do not persevere in attempting to better your aim, by holding it still longer; but, at once bring the rifle down from the shoulder, breathe freely, and try again, as it is impossible to fire so true as at a first sight. There are times, however, when you will shoot more unsteadily than at others, if you were ever so carefully inclined; for the slightest derangement of the nervous system would certainly deprive you of the full amount of firmness which is really necessary to produce good shooting. There are also other causes of irregular firing, some of which you may partially obviate, but others you cannot control. To some of these I have already alluded; to others I will direct your attention as we proceed.

After pressing the trigger, you should continue to look at the object, keeping the rifle immoveable at the shoulder, for two or three seconds, as this will prevent any starting or throwing back of the head, which is often the case in firing; it will also tend to prevent accidents in case the rifle should hang-fire. A skilful and steady shot may always be recognized by his attention to this pre-

caution; and, should his rifle miss fire, he will take care in pricking and cleaning the nipple, to direct the muzzle away from any one, as it sometimes happens that a portion of the percussion powder is left on the nipple, which will, by friction in cleaning, cause the charge to explode. When at practice, always consider a rifle loaded, and never point it, or suffer it to be pointed, at any living being; it should always be carried in such a position as not to injure any one, should an accidental discharge take place. Prevention is better than cure; I therefore cannot too strongly impress it on your mind that fire arms are very dangerous instruments, and that the utmost care is requisite in using them.

If your sights are not correctly placed, the line of aim will not be in the same vertical plane with the axis of the barrel; and the aim so taken will not carry the bullet in the true line of vision, but always to the right, or to the left. If you find this to be the case, let the back sight be fitted like a fixture fairly on the barrel; then move the front one to the right or left, in such a way that the line of sight thus arranged shall be in the plane of fire or vertical plane; that is, if the bullets strike to the right of the mark, move the front sight a little to the right; but if they strike to the left, move the front sight a little to the left. When once you find that you have got your front sight correctly placed, make a mark on it, and a corresponding one on the barrel; so as to be able to tell at a glance, if the sight shifts in the slightest degree, during the time you are firing.

As a preliminary practise, I would strongly recommend you to aim at a small mark, and press the trigger, with caps only, as the smoke from the discharge prevents young riflemen from seeing whether they shake the muzzle or not in firing. This exercise is excellent for forming good marksmen; and, besides the saving of ammunition, it has the recommendation of being easily resorted to at any time, and in any weather, by setting up a mark in a garden, or court yard. The nearer you are to the mark the smaller it must be. You may even resort to this sort of practice in a room, by fixing a small red, or black, wafer on the wall at one end, and taking your stand at the other. By repeating this exercise until you have attained a perfect steadiness in position, before, during, and after pressing the trigger, and can accomplish it without winking, starting, or shaking the muzzle of the rifle, you will have attained a confidence and command over yourself and your rifle which will be of the very greatest advantage to you on ball-practice days; for those who are able to snap caps while aiming at a mark, and retain a perfect immobility of body, may be looked upon as likely to prove excellent marksmen when in the field.

CHAPTER VII.

CAUSES OF IRREGULAR FIRING.

The Recoil.—The Wind.—The state of the Atmosphere.—The position of the Sun.

HAVING alluded elsewhere to the *recoil* of the rifle, I shall now direct your attention to it more fully, as it is the cause of considerable irregularity in firing.

The "recoil" is the motion which the explosion of the powder communicates to the charge. The direction of this motion is opposed to that of the bullet, and has a tendency to throw the firer out of line, making him, in a slight degree, wheel round; the deviation produced being, at the same time, partly vertical, as well as horizontal.

The *force* of the recoil depends on the *charge of powder*, the *weight of the bullet*, and the *weight of the rifle*. By augmenting the charge in certain proportions, the recoil is increased—the quantity of gas produced by the explosion becoming more considerable; if the charge is diminished, the recoil is lessened. The *least* quantity of

powder which is found to act satisfactory should, therefore, be fixed on as the charge, and adhered to. The weight of the bullet has also an influence on the recoil; for the obstacle opposed to the expansion of the powder gases is the more powerful in proportion as the bullet is heavier. The force of the recoil, which depends on the action of these gases on the hinder part of the barrel, will therefore be augmented, if the weight of the bullet be increased. If the windage is lessened, the recoil will be augmented, as a smaller quantity of gas will escape between the bullet and the barrel. The fouling, which diminishes the windage and increases the friction of the bullet against the sides of the barrel, will also, as I have already remarked, augment the recoil. The method of loading and driving home has, besides, a great influence on it.

The heavier the rifle, the less will the recoil be felt, as the same force will communicate less velocity to any body in proportion as the weight of that body is increased. When the person firing, therefore, is careful to keep the rifle firmly against his shoulder, he and the rifle almost become one body—the rifleman and the rifle receive, in some measure, the motion of the recoil together; while on the other hand, if the rifle does not touch the shoulder, or only presses gently against it, the rifle strikes this part of the body with an energy proportionate to the rapidity of the motion it has received. The motion of the recoil has for its direction the axis of the barrel; if the stock were, therefore, straight, so as to prolong this axis, the

person firing would experience the whole force of the recoil, but the stock being bent, in order to facilitate the aim, the rifle loses its tendency to recoil; the effect of this bend, however, if it tends to lessen the recoil of the piece when resting against the shoulder, tends also to throw the muzzle up, by making it turn, as it were, on its fulcrum at the bend, although the arms are, or ought to be, employed to resist this action.

The use of too fine powder is also the cause of a very unpleasant and dangerous recoil; as the compressed air in the muzzle of the barrel exerts a resisting influence against the charge, which is not of a sufficiently expanding power for the capacity of the barrel; there being a greater column of air in the barrel than the explosive fluid is able to displace, as it would do, if the powder were of a larger grain.

Having alluded to causes of irregular firing, which, by care and attention you may rectify, I shall now take notice of others over which you can have no control, but which, by careful observation, you may render less injurious to your firing.

The first is the effects of the *wind* upon the flight of the bullet. When the wind is blowing from a quarter exactly opposite to the direction of the bullet, the latter will experience a greater resistance, and be proportionally lowered; the muzzle of the rifle must, therefore, be proportionally raised in order to hit the mark. When the wind is blowing in a line exactly with the direction of of the bullet, it adds to its velocity, and raises it in the plane of projection, making it strike higher;

the muzzle of the rifle should, therefore, be proportionally lowered. When the wind blows from a quarter which forms an angle to the direction of the bullet, that is to say, from either side, the bullet is carried to the opposite side from whence the wind blows, and the more so the nearer the wind blows from a right angle. A very important point in connexion with the wind, is to recollect that the more that the target is distant, the greater the deviation will be, as the bullet remains subject to its action for a greater length of time; and also that the deviation will be still more as the force of the wind is greater. Your aim must, therefore, be more to the side from whence the wind blows, in proportion to the force of the wind, and the distance you are firing from.

It is very easy, I admit, for me to tell you to aim a little higher, a little lower, a little to the right, or a little to the left, for this is a very uncertain mode of taking aim, and requires great practice in all kinds of weather, and at all distances; and even then a sudden gust of wind may strike the bullet on its passage, and completely upset your nicest calculations. You must, therefore, be careful, in making any compensation, as it is called, not to venture too far with your aim from the bull's eye, until you have had sufficient experience.

The next is the *state of the atmosphere* on practice days. When the temperature is high, the density of the air is less, and the resistance it opposes to the bullet is weaker; the bullet rises, and, consequently, the range will be somewhat

longer; in order, therefore, to hit the mark, the muzzle should be proportionally lowered according to the distance. When the temperature is low, the density of the atmosphere is greater, and, as its resistance will be more, the range of the bullet will be somewhat less; the muzzle should therefore, be proportionally raised. Every change in the temperature, by varying the density of the air, changes the form of the trajectory, and, elevates or depresses the bullet, but without causing it to quit the plane of projection. The temperature and humidity of the atmosphere have, besides, a great influence on the rapidity of the inflammation of the powder and the force it developes at the moment of explosion.

The *position of the sun* is also sometimes the cause of irregular firing, by rendering the true line of sight more uncertain. When the sun is on the right, the right side of the front sight appears bright, while the left side is thrown into shade; an inverse effect is produced on the notch of the back sight, for the right side of the notch will be in the shade, while the left side will appear bright. A bright spot will, therefore, be seen on the left side of the notch of the back sight, and the right side of the front one, which will attract the attention of the firer, and lead him to aim by directing on the object a line of sight passing on the left of the centre of the notch of the back sight, and the right of the front one; the effect of which will be that the axis of the barrel will be inclined to the left, and the bullet will, consequently, strike on the left side of the target. When the sun shines on the left the effect

will be exactly the reverse; and the only remedy for this cause of deviation is to aim a little to the right when the sun is on the right side, and a little to the left when the sun is on the left side.

CHAPTER VIII.

ON JUDGING OF DISTANCES.

By the apparent height of the markers.—By the stadia.

THE great importance to a rifleman, of being able to estimate distances correctly, may be very readily conceived.

In firing at the target, simply for practice, the distances are well known, and nothing is required but to arrange the slide of the back sight, to aim correctly, and to fire with care and attention; but it would be otherwise if you were opposed to an enemy in the field, where the distance would be necessarily unknown, and where you would be required to decide with promptitude, and as exactly as possible, the distance, and regulate your firing accordingly. This can only be accomplished by continual practice and observation, as that alone can impart a species of precision, an accuracy to the eye, which permits the measurement of long distances sufficiently exact for the purposes of the rifleman.

By careful observation and attention, you may render your ordinary target practice of great use

in judging of distances, as you have only to keep in mind that the target we usually fire at is six feet high, and that a soldier with his shaco on is about the same height. You have also the opportunity of observing the apparent height of the markers as they move to and fro. By carefully studying their apparent height from the different distances you fire from, you would learn to measure with the eye, with tolerable certainty, the distance you are from a man; and acquire that readiness and quickness in deciding upon it, that is so essential in making expert marksmen. A still more efficient mode of practice may be adopted, by having a target, the size of a soldier, placed in unusual parts of the practice ground, and you marched to different and uncertain places to fire from.

Your back sight being arranged for firing at round numbers, as 200, 300, 400 yards, &c.; if the enemy appeared to be at any of those distances, you would merely require to shift the slide accordingly, and aim at his waist, or, as on the target, the bull's eye. If he appeared to be about twenty-five yards further away, aim at his breast; if fifty yards farther away, aim at his head; if about twenty-five yards nearer, aim at his knees; and if fifty yards nearer, aim at his feet. In damp and hazy weather the objects, being less lighted, will appear more remote than they really are.

It is quite impossible to lay down exact rules as to the precise part of the body to aim at, as rifles vary in their *trajectories*, as I have explained under that head; this, therefore, can only be learned by practice, and by always firing with the same rifle.

There are scientific instruments of various descriptions manufactured for the purpose of measuring distances; the most simple and easy of application, is called a *stadia;* but none of them are likely to become general in actual warfare.

CHAPTER IX.

ON THE SELECTION OF A RIFLE, OR GIVING AN ORDER FOR ONE TO BE MADE.

Calibre, or Size of the Bore.—Length of the Barrel.—Nipple.—Grooves.—Number, and Degree of Spiral.—Lock.—Trigger.—Stock.—Ramrod.—Sights.—Weight.

A GREAT deal has been lately said about the *Minié* rifle. I know of no such weapon; it is quite a misnomer; and, what is more surprising, the name is often made use of by those who ought to know better. There is the *Minié bullet*, it is true, and a great deal of good shooting has been made with it (compared with the old spherical ball), but it is fast losing its character, and is giving place to other improvements.

In the selection of a rifle, or in giving an order for one to be made, their are two important points to be attended to, namely, the *bore* of the barrel, and the *nipple*.

To be suitable for government ammunition, the barrel should be exactly 577-thousandth parts

of an inch in the diameter of the bore. And I would recommend that the bore be made exactly the same diameter from end to end, or, as some call it, a true cylinder. Its exact size, measured in this manner, should be insisted on; taking the government standard as a proof; for though it is what is technically called a 24-bore (that is, the diameter of a spherical ball weighing 24 to the pound)—gunmakers' gauges do not always agree in their size, as may be easily proved by some of the rifles you have lately purchased. The cause of this discrepancy arises from the fact that gunmakers' gauges are not made according to any recognized authority; but are simply what they have been in the habit of using in their various establishments for a length of time.

The length of the barrel of the military rifle musket is three feet three inches; but then it is intended to be used as a pike, with a military bayonet. The length we have adopted is two feet eight inches, and this has been found to answer very well—when the charge, in quantity and quality is carefully attended to; for, as I have shown in Chapter III., it matters not what the length of the barrel may be, if the *size* of the grain, and the *quantity* of powder, is not suited to its capacity.

The nipple ought to be the same size as the military one, in order that the government percussion-caps may fit properly.

With regard to the grooves, I would recommend having an odd number, as three or five. If the number be even, as two or four, the grooves

will be opposite to one another, and the bullet will require a greater force to enlarge it, so as to fill them properly. If the number be unequal, as three or five, the lands will be opposite to the grooves, and the lead, in forcing, spreading on all sides, will encounter a land opposite to each groove, which will in some measure repel it, and render its introduction into the grooves, with a lesser force, more powerful and complete, so as to prevent the gasses from escaping *past* the bullet.

If you use cartridges, it may be of little consequence whether your rifle has three or five grooves; but if you use patches it very materially alters the case, and five grooves are to be preferred to three; for when the grooves are few in number the lands are generally broad in proportion, and the patch, instead of doubling up *into* the grooves, is forced to double up irregularly *on* the lands, and so prevents the bullet from sitting straight, by giving it an inclination to one side or another. You will also be prevented from using a nicely-fitting bullet, which is of the utmost consequence in rifle shooting.

I would recommend that the grooves be made somewhat broader than the lands, and that they be of equal depth from breech to muzzle. With regard, however, to the most fitting depth, that is a matter of experience. If they are very deep, the projections on the bullet will be considerable, and will form, as it were, wings, which will meet the wind, and consequently diminish the rotatory motion and range. Moreover, if the force of the powder is not sufficient to cause the

bullet to expand sufficiently into the grooves, part of the propellant gases will escape past the bullet, and lessen its velocity and range. It is necessary, however, that the grooves should be deep enough to maintain a proper hold of the bullet in its passage through the barrel, in order that the rotatory motion may be communicated to it, but any greater depth would be a very great evil. Broad shallow grooves, with rounded edges, have the advantage of not leaving any angular traces on the surface of the bullet; besides, they afford a greater facility in cleaning the barrel.

The proper inclination of the grooves is also of great importance, for if the charge is powerful, and the spiral much twisted, the bullet, being violently driven, will not expand into and follow the direction of the grooves, but will strip, as it is called, and leave the barrel without having acquired the rotatory motion it was desirable to give it. But supposing that the bullet did not strip, but enter the grooves, the friction produced by so much twist would be a very great evil, as it would not only retard the bullet in its passage through the barrel, but it would also retard it in its passage through the air; for it would cause the bullet to present the different parts of its surface in too quick succession to the opposing action and friction of the air, and would, consequently, be just so much power or powder actually thrown away, as nothing destroys power more than friction. On the other hand, if the spirals are at too small an inclination, the rotatory motion of the bullet will not have the velocity necessary to

overcome the different causes of deviation in its flight at long distances, as it would soon cease to rotate, and, consequently, to fly true.

The new military rifle musket has the grooves with a regular spiral of one turn in six feet six inches, being half a turn in the length of the barrel, it being three feet three inches. I can see no great objections to this, although I consider it quite enough, it is, however, better to have a little too much twist than too little. For my own use I prefer the increasing, or accumulating spiral; that is to say, beginning nearly straight at the breech, and gradually increasing in the twist towards the muzzle, in a true geometrical line, so that in the whole length of the barrel (two feet eight inches) it makes a quarter turn, or thereabouts. With a barrel of this description I believe that the bullet is less likely to pass out without rifling itself, as the gases, after the powder has been ignited, forces it by a gradually-accumulating power into the grooves, and by the time that the bullet has reached the more rapid turn of the spiral, it is so imbedded into the grooves as to prevent its leaving them until it leaves the muzzle of the barrel. The bullet is also less likely to make the rifle cant on one side by screwing its way out all along the length of the barrel.

The mechanism and form of the interior of the lock is best left to the gunmaker, who, for the sake of his own reputation, may be expected to furnish one which will do himself credit. The cock, when at half-cock, should be at such a height from the

nipple as will admit of the cap being placed on it without inconvenience. In many locks this is not the case, as they require to be placed on *full* cock before capping. This should never be allowed, as the danger arising from a worn or faulty scear or tumbler cannot be compensated by any ideal advantage this plan may be supposed to have.

I am no advocate for hair triggers in common, as they are apt to get out of order, and become dangerous even in the hands of the most careful men. If triggers generally were made longer and straighter, and fixed into the stock so that the scear would rest on the very end of the upper part of the trigger, it would be a great improvement, as a lighter pressure of the finger would be required in consequence of the increased leverage which would be gained. The finger ought lightly to *feel* the trigger; with a hair trigger this is almost impossible, without running the risk of letting the rifle off before you have properly covered the object intended to be hit.

In rifle shooting a long stock is invaluable, as it can be held so much more steadily to the shoulder. Some require longer stocks than others, but all should be made as long as the shooter can, without inconvenience, bring to the shoulder. The fore part should be carried at least twelve or thirteen inches in front of the guard, so that the left-hand would grasp the wood-work instead of the barrel alone, when holding the rifle properly. The stock should never have the grain of the wood running cross at the small of the butt, or where

the lock is let in, as a blow from a fall, or any other accidental circumstance, will be liable to cause a fracture, which can only be remedied by a new stock, as some of you already know by experience.

Ramrods in general are not made thick enough. A wooden one made nearly as thick as the bore of the barrel would be much more effective in ramming down the bullet straight, so as to preserve its axis in a true line with the axis of the barrel. It would also enable the cup at the lower end to be made larger, and of a better form for pressing down the bullet without injuring its shape. Some gunmakers may object to a thick ramrod, as interfering with the elegant appearance of a rifle; but apparent solidity in a military rifle cannot be a fault, so long as it does not add any unnecessary weight to it, and the benefit accruing from a thick ramrod would a thousand times counterbalance any drawback it might be supposed to have in appearance. If good shooting is to be sacrificed to lightness and elegance of appearance, there would be an end to all improvement in the rifleman's practice.

Rifles are generally sighted for the different distances by the gunmaker; but as all do not take aim alike, some taking the front sight fine, while others take it full, in the line of vision; it would be better for the purchaser to have the back sight marked with a graduated scale of—say twenty parts to the inch, and then mark upon it his own distances according as he progresses in practice. By this plan he would be able to mark the scale

to suit his peculiar mode of taking aim, and also in accordance with the quantity of powder he is in the habit of using, otherwise some compensation will most likely be required to be made by elevating or depressing the muzzle of the rifle, which is not always a satisfactory mode of firing at a distant mark.

I strongly recommend a heavy rifle, as the shooting will be more steady with less recoil, particularly if the weight of the metal be judiciously accumulated behind, and immediately surrounding, the breech. But then you must consider well, in giving an order, what weight you will be able conveniently to carry during a long day's practice. The new military rifle musket, including bayonet, is 9*lbs.* 3*oz.* The one I use is 9*lbs.* 8*oz.* without a bayonet.

In the preceding remarks I have recommended nothing that will add to the usual price of a good club rifle—for inlaid stocks and engraved locks do not make one shoot any better. A great deal of money, however, may be laid out in what is called extras and extra finish, for "a fancy article," requires "a fancy price."

CHAPTER X.

ON CLEANING THE RIFLE.

Names of the different Parts of the Lock.—To take the Lock to pieces.—To put it together again —Washing the Barrel.—Examination previous to Ball Firing.

I NOW come to the cleaning of the rifle, as a very great deal depends upon having it always in first-rate order.

The lock does not require to be taken off every time the rifle is used, but it is advisable to look at it now and then, but more especially when you have been shooting in wet weather, and, with a feather or small fine brush, wipe off the old oil and put a little fresh oil on the parts where there is any friction. You can buy in the gun-shops a small bottle of oil prepared for the purpose, which will last you a long time. The soft pleasant action of the cock, and lively click of the scear as it falls into the tumbler, should be carefully attended to; when these are not satisfactory, the lock should be taken off and examined. Before removing the lock, place it on half-cock, and lower it immediately after the lock has been removed.

In the event of the lock requiring to be taken to pieces, for the purpose of being thoroughly cleaned, it might be advisable to send it for that purpose to a gunmaker, but as a clever rifleman would most likely prefer attending to this himself, I shall give such directions as will enable him to take it to pieces, and, after cleaning it, to put it together again; but before doing so I shall first describe the different parts of the lock, in order that no mistakes may be made in its dissection.

1st. *The Mainspring* is the large spring by which the tumbler and the cock are worked.

2nd. *The Tumbler* is the centre piece which moves with the cock, and in which are the bents, or notches, where the scear catches at half and full cock.

3rd. *The Bridle* is a piece of steel which covers the tumbler, and in which the tumbler works; it is fixed to the lock-plate at the top by two screws called the bridle screws, and at the bottom by another screw called the scear screw.

4th. *The Scear* is that part which catches the tumbler at half and full cock, and which the upper part of the trigger pushes up to discharge the rifle.

5th. *The Scear Spring* presses the scear against, and holds it in the bents, or notches, of the tumbler, for either half or full cock.

6th. *The Swivel* is a crooked bit of steel, somewhat like the letter S; it is attached to the tumbler at one end, and at the other it receives the end of the mainspring.

7th. *The Detant* is a little piece of moveable

metal attached to the tumbler to prevent the scear from catching at half-cock when the trigger is pressed; it keeps the scear from going into the half bent until the cock is let down and drawn back again.

8th. *The Tumbler Screw* is the screw which fastens on the cock.

In taking the lock to pieces, proceed as follows: 1. Place the lock on full cock; take the spring-vice and cramp the mainspring, screwing the spring-vice gently, just sufficient to give the cock a little play; let down the cock, and the mainspring will be easily detached from the swivel and its seat in the lock-plate. It may be advisable to let the mainspring remain in the spring-vice until it is again replaced, as cramping the mainspring, when it is off the lock, is a somewhat difficult matter to the uninitiated. 2. Place the lock on half-cock, and unscrew the bridle screws, and then the scear screw, and be careful not to mix them. 3. Take off the bridle, and then the scear. 4. Unscrew and take off the scear spring. 5. Unscrew and take off the cock. 6. Take off the tumbler, and then the swivel and the detant.

In taking a lock to pieces, and when cleaning the different parts, and putting them together again, use a pair of old gloves, to prevent the warmth of the hands from causing rust.

In putting the parts together again: 1. Put in the tumbler and swivel, driving the axletree home by using the handle of the screw-driver, and striking it a few gentle blows; then screw on the cock and put on the detant. 2. Screw on the scear

spring. 3. Put in the scear in its place. 4. Fix on the bridle, with the two screws and the scear screw. 5. Let down the cock; hook the end of the mainspring on the swivel, and move it up into its position on the lock-plate; unscrew the spring-vice, and the lock will be complete again.

If the mainspring has not been left in the spring-vice, place it in its seat on the plate, and then draw the limbs together by the spring-vice sufficiently to allow the end being put into its place on the swivel, the cock being down. Never confine the mainspring closer than is absolutely necessary, or you will soon weaken and spoil it. In order to ease the springs, the cock should always be let down upon the nipple, when the rifle is not in use.

The barrel should be thoroughly cleaned every time the rifle is used, and in proceeding to do so, first take out the ramrod, and unscrew the muzzle end of the sling, then place the lock on half-cock, and draw the bolt, when the barrel will easily be removed from the stock.

Place the breech end of the barrel in a pail or large jug, half full of cold water, and, with the wire brush attached to the cleaning rod, work it up and down a few times, to loosen the filth from the lands and grooves of the barrel. A brass brush is better than a steel one, as it is softer, and less likely to injure the barrel.

Then, with a sponge or piece of cloth attached to the cleaning-rod, work it well up and down until the water runs off quite clear; after which, place the barrel in some clean hot water, and

work the sponge or cloth for some time longer, until you think the barrel is perfectly free from all impurities.

This operation completed, blow strongly into the nipple; then turn the barrel downwards, and let it drain off for a minute or so; then work it dry with one or two bits of clean rag. This will very quickly be effected in consequence of the heat left in the barrel by the application of the hot water, as the heat will drive off any moisture which may remain, and facilitate the penetration of oil into the breech and nipple.

Put an oiled rag on the worm of the cleaning rod, and pass it up and down several times, so as to leave the inside of the barrel in a moist state; then rub over the outside with an oiled rag until every part is perfectly clean and free from rust.

Before using the rifle again, take a piece of dry cloth and wipe the barrel clean out, and on arrival at the practice ground, before loading with a bullet, put in a charge of loose powder and fire it off, in order to ascertain if the nipple and anti-chamber are clear, and in a proper order for shooting.

It is not necessary to take the nipple out often, unless for the purpose of examining the anti-chamber; nor should it be used after the hole has become large by repeated firing, as the great escape of the gases by it is apt to injure the lock, by forcing the cock up to the half-bent. The escape of the gases by that passage has also the effect of very materially lessening the power of the charge.

It would be advisable to have the breech taken out and examined during the course of the season, when the interior of the barrel could also be examined; but this had better be done by the gunmaker, unless your mechanical powers will enable you to do it properly. In unscrewing the breech, great care should be taken not to wrench it, or the threads of the screw may be completely destroyed. Clean the threads, and oil them well, before screwing the breech in again.

CHAPTER XI.

ON THE BULLET.

Bullets.—Bullet Moulds.—Casting Bullets.

BULLETS of an elongated form have completely superseded the old spherical ball; but as improvements on the new form are still going on, I am not at present prepared to recommend any one in particular. This much, however, I may say, that were I to compete for a prize, I should be very sorry to be obliged to place my dependance on the so-much-vaunted *Minié*, or, more correctly speaking, the *Delvigne-Minié* bullet (M. Delvigne having, it is said, originated the bullet, to which Captain Minié added an iron cup), as several late improvements have as much surpassed the *Minié* in efficiency and correctness, as the *Minié* has surpassed the spherical ball.

The bullet which I use is of an elongated form, but it has neither cup, plug, nor hollow in the end of it; and, from the experience I have had, I am

convinced that none of these contrivances are necessary; for if the bullet has length enough, and fits properly, the *vis inertiæ* of the fore part alone is quite sufficient to resist the onward movement of the latter part, until a sufficiency of the lead has been expanded into the grooves, by the power of the expanding gases engendered by the inflamed powder.

All compound bullets, such as the *Minié*, I consider are bad in principle, as the liability of the parts to separate is at all times the cause of very uncertain and dangerous shooting. With the *Minié*, I have often seen the iron cup, after separating, strike the ground forty or fifty yards in advance of the shooter, and the bullet itself go wide of the mark. I have also picked up *Minié* bullets where the iron cup had been forced completely through the lead, leaving them, in appearance, like a piece of leaden pipe. The iron cup is also irregular in its action, as it is sometimes forced on one side and sometimes on another, which must, as a matter of course, throw the centre of gravity out of the right line, or axis, of the bullet.

As I have already mentioned, the bullet I use has neither cup, plug, nor hollow in the end of it. It is enlarged in diameter, just above where an inch and a quarter patch reaches in doubling up, so as to fit the barrel *exactly* at that part for nearly an eighth of an inch. By this plan the centre of gravity is well thrown forward, and the axis of the bullet is always kept in the same line with the axis of the barrel.

I have made better and more regular shooting

with this bullet than with any others I have ever tried, but I do not say so for the purpose of recommending it in particular, but simply to draw the attention of the rifleman to the fact, that the *form* of the bullet has a very great influence on the correctness of the shooting; and that, when he turns his attention particularly to this point, it will be a sure sign that he is on the right road to excellence as a marksman; it being impossible for him to study one part correctly without taking into consideration all the laws which govern the flight of projectiles.

In giving an order for a bullet mould to be made, take care that it be not formed so as to have the lead poured in at the front, as the cutting there, for the purpose of removing the castable, or neck, destroys the symmetry and smoothness of the front part of the bullet, which it is so desirable to retain. All who have a correct knowledge of the effects which the friction and resistance of the air have upon projectiles, will readily conceive how far a little roughness or irregularity, on the front part of a bullet, may cause it to be driven from the true line, especially at long distances.

In casting bullets, use an iron pot for melting the lead in, and a small iron ladle for taking it out of the pot and filling the mould. Do not melt more lead than you intend to use at one time, and take care that it be neither too hot nor too cold, for if the lead be so hot as to boil like water, the bullet will be too light and hard, and if it be too cold the lead will not run so as to fill the mould

sufficiently, and of course the bullet will be too small.

When the lead begins to melt in the pot, put in a little bit of tallow, and stir the lead up with a thin piece of iron, when the scum and dirt will rise to the top, which, of course, you must skim off. The molten lead will then appear quite clear, and be fit for use. Keep it in the same temperature by placing the pot in a proper place on the fire; for if it becomes too cold and requires to be melted over and over again, this repeated melting of the same lead will harden it like pewter; whereas, good shooting bullets ought to be soft and even in composition, which cannot be the case, if care is not taken to keep the lead in an even temperature at the time of casting.

When you commence, it is requisite to make too or three preparatory castings, in order to heat the mould generally; and those bullets first cast should be thrown back into the melting pot; as the bullets are only fit to be retained when the mould is sufficiently heated, and the lead in the pot is at a sufficiently high temperature.

If, in casting, any lead be left about the mould that may prevent it from closing exactly, never use a steel or iron blade, but remove the lead with a wooden scraper, in order that the shape of the mould may not be injured.

During casting, the mould will frequently become so hot that the lead will not fit as it ought to do, or the bullet will become hollow. In this case the mould may be put into cold water, closed with a bullet in it to prevent the water getting in,

and then wiped dry, to prevent the lead flying in your face when you cast again. If you have made the mould too cold by putting it in water, hold it to the fire, or cast another waste bullet in it; for if it is too cold the lead becomes chilled, and the bullet will be too small and too light. The great art is, therefore, to keep the lead always as near as possible at the same temperature, and the mould at an equal heat. It is also better to keep the ladle in the pot when not in use, to prevent it from getting too cold.

Bullets must always be regarded as defective when their shape is not clearly defined; all scant and mis-shapen ones should therefore be rejected. It is a good plan to have a short piece of smooth barrel of a proper calibre to pass the bullets through after the casting is over, when all that do not fit nicely should be put aside, for bullets cannot be cast too true for rifle-shooting. Those which are rejected may be set aside until another casting takes place, when they may be put in the melting pot with the new lead.

Great care should be taken that neither pewter, tin, nor plumbers' solder, be mixed with the lead you purchase for casting rifle bullets, as they will be much more difficult to get down the barrel, from their hardness, if they be made to fit as close as they ought to do; besides, they will, in consequence, be rendered much lighter, and, of course, will not range so far nor so true. The lead should be quite pure to ensure good bullets, and perfection in shooting with the rifle.

CHAPTER XII.

PARADE AND FIELD EXERCISE.

Facings.—Marchings.—Skirmishing.

LIEUTENANT-GENERAL SIR CHARLES NAPIER, in his letter "On the Defence of England, by Volunteer Corps and Militia," says, "Get some old soldier for your adjutant to teach you, not a long course of drill, but just seven things, viz. :—

1. To face right and left by word of command.
2. To march in line and in column.
3. To *extend* and *close* files as light infantry, with "supports."
4. To change front in *extended* and in *close* order.
5. To relieve the skirmishers.
6. To form solid squares and "*rallying squares.*"
7. To form an advanced guard.

These seven things are all you require; do not let anyone persuade you to learn more."

The above course of drill is admitted by efficient judges to be quite sufficient for any but professional soldiers; indeed, when entered into, it will be found to comprise far more than at first sight it may appear to do.

The 1st, 2nd, and 7th things mentioned may still be taught according to the instructions laid down in the "Infantry Manual;" but with regard to skirmishing generally—"*changing front*" in extended order—having "supports" at *short* distances in *close* order—their *movements* when *under fire*, &c.,—the present system, as I have often observed, cannot be maintained under the control of the *long range* rifle. A change must, therefore, as a matter of necessity, be made in the manœuvres of riflemen when so employed.

In corroboration of the truth of what I have ventured to state, I shall, in this chapter, introduce some observations from the writings of General and Field Officers of great experience, who appear fully alive to the necessity of such a change. Their opinions will, I have no doubt, carry the stamp of authority with them wherever they are quoted. By you they ought to be particularly attended to, as, in many instances, they have specially adapted their remarks to the capacity of a defensive force, consisting of Irregular Troops.

"Under the immense increase which is now taking place in the length of range, and accuracy in effect, of small arms, there must of necessity come an increase of the importance of skill in skirmishing. The reconnoissances of mounted staff officers, the patrolling, skirmishing, and menacing of charges by small bodies of cavalry, and even the action of artillery, on that very large proportion of the surface of the earth in which vision is limited to at most one thousand yards, will be greatly controlled by the accurate and

distant infantry marksman. Nay, even columns and lines of infantry will now only be able to repel his power of destructive annoyance by meeting him with troops in *extended* order. Of old, if he pressed too near to a closed body of infantry, an impatient volley might sweep him and his comrades into annihilation; but now, ensconsed in his distant cover, he may 'beard the lion in his den,' a battalion of infantry in position, with something like impunity."*

The British soldier is but too apt to look upon this species of warfare as partaking somewhat of the cowardly; but this is a mistaken idea, for no degree of cowardice can attach itself to the rifleman, who takes advantage of every species of cover he can find. Indeed, it is his duty to do so, and "not only to seek for cover, but to make the best of it," even to "the smallest bush or inequality in the ground," behind which to screen himself. It is not his life as a sacrifice, but his services, that his country requires; the more damage, therefore, that he can do to the enemy, with safety to himself, the better; for, "*in skirmishing, more than in any other branch of warfare, men may be uselessly thrown away;* and therefore, in this, more than in any other, economy of life and limb should form a paramount object of attention."

The man in the ranks who shrinks away from a a shell or cannon ball, or who goes out of his commanded course to cover himself from musketry,

* "The Essentials of Good Skirmishing," by Colonel Gawler, K.H., late of the 52nd Light Infantry.

has little claim to the name of a *brave* soldier; while he *who in a skirmish neglects to make the best of every foot of cover*, has no right to the title of a *wise* one. The difference arises from the line of military perfection being struck, not according to what will suit or save the individual, but by that which will benefit the general service.

"At every change of situation 'supports' should also, if possible, be placed under cover by their commanders, and *loosened into extended order;* for, if exposed as large bodies, they form most inviting marks to the enemy's long shots. In a tolerably open country, under the long range, the interval between the 'skirmishers' and the 'supports' should scarcely be less than 300 yards; and, for the future, within the range of 800 yards, *all* movements under the fire of a well posted enemy *must* be at the 'double quick,' to avoid ruinous destruction. If the distance required cannot be surmounted in one effort at such speed, it must be traversed by *successive dashes* to intervening cover." *

The admirable nature of almost every part of of this empire for *defensive* warfare, is a fact which cannot be too frequently mentioned. The country, unlike the greatest part of the continent, is laid out in fields, varying in size from one or two to fifty acres, but the average about eight, being separated from each other either by stone walls, or fences of thorn, or other growing shrubs, behind which, even in winter when divested of leaves,

* Colonel Gawler.

its defenders could not be discerned. Thick woods and copse are also interspersed all over the country, within short distances of each other; making it the best adapted country in the world for defensive warfare by Irregular Troops;—for Militia, Yeomanry, and Volunteer Corps, with their partial training, cannot be considered otherwise.

"With such an army as we could bring into the field, the bulk of which would be ill-organised, the defensive system is the only one we should or could adopt in the event of an invasion by a powerful enemy, the nature of the country being so well suited for that purpose. '*Battre en retraite*' —retire fighting—but disputing every inch of ground with courage, energy, coolness, and determination; the whole front of country which our foe would occupy in pursuit, we should cover with a line of skirmishers, the front line, that immediately opposed to the enemy, having the same number of men about 150 yards in rear of it as a 'support,' and in *extended* order, although against the rules of 'Light Infantry drill,' as laid down in 'the book,' with the 'reserve' in column, about 150 yards in the rear of the *centre* of the supports, ready to be thrown out to the front, or either flank, if occasion required."

"I have recommended the defensive system—'*Battre en retraite*,—which, while falling back on our resources, could be our only course of action, until we felt confident, by the presence of all the Regular Troops that could be mustered, of successfully assuming the offensive; but even with an irregular body of men, an active, enterprising

officer, might cause the enemy much loss and annoyance. The late General Trant, during our retreat after the battle of Busaco, with only a body of Portuguese Militia just raised, hung on the rear of Massena's army, checked his pursuit, cut off his foragers, sick, and stragglers, and put the enemy to great straits for provisions."

"Every regiment should have attached to it one Pioneer per company; good 'hedgers,' of which there are plenty in the rural districts, should be selected for this duty, each provided with a pickaxe, shovel, a hatchet, and a saw, slung at his back. Each corps would thus have a certain number of Pioneers, who should be instructed in throwing up breast works where needed; but the principal duty of this class would be *to cut gaps at the angles of each field*, to facilitate the passage of their men when retiring before the enemy; and, as the last of the men defiled through the gap, from one field to the other, the Pioneers, after filling up the gap again, or concealing it with the *debris* of what they had cut to make it, should retire to the next boundary, and open a similar passage through it, in readiness for the skirmishers to retire through, if necessary."*

According to Sir Charles Napier's recommendation, each rifle corps should consist of not more than 400 men, divided into companies of 100 each; this being as many *volunteers* as one Colonel could

* "A Guide to the Organization and Training of the Militia, Yeomanry, and Volunteer Corps," by Colonel Raines, late of the 95th Regiment of Foot.

command with efficiency. According to Colonel Raines, the regiment would, therefore, be divided into three (not equal) parts. "Skirmishers," which the front line is called, should be composed of one company; the "supports" to be of the same strength as the advanced skirmishers; and the "reserve" to consist of the remainder of the corps.

Of this number, the right (or No. 1) company should be the first to take up the line of *advanced* skirmishers in extended order, the files, (two men, front and rear rank) from four to six paces from each other. The company, thus covering from 200 to 300 paces of front, should establish themselves *in rear* of a fence, which thus becomes a breast work, and behind which they might, with comparative safety to themselves, and, consequently, with coolness and precision, inflict a terrible vengeance on their opponents at a distance of 800 to 1000 yards. Keeping in mind, while so engaged, that *one* effective shot in *ten* minutes is better than *ten* ineffective shots in *one* minute.

The second (or No. 2) company should be formed—*also "in the same extended order"*—behind the fence in the field, immediately in rear of the advanced skirmishers, in order to be ready when those hard pressed are forced to retire; and when the front was clear, to open their fire on the enemy. The retiring skirmishers facing outwards, and making the best of their way, without confusion, to the gaps which the Pioneers had cut; the right sub-division facing to the right, and retiring *diagonally* by the right angle; and the

left sub-division facing to the left, and retiring *diagonally* by the left angle; the whole moving off *independently* in "double quick" time, clearing their front as rapidly as possible, in order that the "supports" (No. 2 company) already established in the next field, might commence firing the moment the enemy showed themselves within range. No. 1 company becoming the "support" in turn, and taking up their ground in the field *in rear* of No. 2, who, for the time, are the advanced skirmishers, and who again may be compelled to retire and become the "support" of No. 1.

The remaining two companies (Nos. 3 and 4) should be formed as a reserve, in column at close order, in the next field, or about 200 yards behind, in rear of the centre of the skirmishers, ready to take the place of the first two companies who may have expended their ammunition, or been ordered to be relieved.

With reference to the employment of volunteers, Sir Charles Napier says, in alluding to the regular army waiting in position for the enemy, "Now you, gentlemen, not being drilled to this sort of work, would be in the way; you would come into it *after a while*, but, *at first*, you would *be in the way*. '*Then where should we be?*' you will ask. Why, far away, clear of the regular troops, and getting round on the enemy's flanks and rear, to be sure! your men in swarms, creeping as close to him as ever you can, hiding in ditches, behind banks, rising grounds, woods, &c., so that his artillery could not do you as much harm as ours could do his *Minié* men; because *you* need not

advance, his *must*, while you were pitching your shot into his columns."

"The enemy *must*, all the while, as I have said, keep moving on, *he* is an invader! *he* cannot sit down and do nothing. He *must* keep continually marching and fighting. If he halts to drive you off, you retire: seldom meeting him in close fight but *always firing at him*, he cannot catch you! he goes back, *then* again you follow him up as he advances against the regular army, you keeping an incessant firing into his back; hundreds will fall under your galling and unerring aim—his hospital increases—he must have guards—you are in vast numbers, a few thousands of you close, and then you may occasionally rush, in overwhelming numbers, upon these guards, make them prisoners, and be off again out of reach. His convoys, too, are coming up, you gather upon and destroy them, carrying off his food and ammunition. Then again if his men straggled on his march, you would shoot them or make them all prisoners, and every hour you would become more expert and more daring. In short, you would leave the regular soldiers nothing to do but the one stern job of fighting the battle, and a very tough one it would be without doubt."

In a country enclosed as England is—the fields, which seldom exceed ten or twelve acres, being separated from the road, when bounded by one, and from each other, by strong hedges, which are generally nearly impenetrable—"Cavalry, should the enemy land any (?) would be comparatively useless to them in offensive warfare.

They could only operate by the main or by-roads, and they could not manœuvre or extend their line, to which the fences, and the long range rifles, would oppose an insurmountable obstacle. Indeed, they would not venture *within shot* of those 'new fangled' weapons, which would tumble them from their horses at 900 or 1000 yards."

"Artillery, too, of which an invading army would make the most strenuous exertions to land a formidable train, ere they should be interrupted by our navy, would, from the obstacles above noted, prove of infinitely less service to them than in an open and hilly country; for, to act with efficiency, as the enemy pressed on the retiring force, they must have a succession of elevated positions, everlooking the whole front of their opponent's line to fire from; but unless they brought guns which could send their shots point-blank further than any at present in use (800 yards) the long range rifle, which, even at that distance, is much more accurate than round shot, would prove of terrible effect against their gunners, who, while our sharpshooters were concealed from view, must expose themselves at their guns, in their elevated situation, as a mark for our riflemen, and at every halt they made, one third of their artillerymen would be put *hors de combat.*"*

In a letter to the "*Times*," General Sir Charles Shaw remarks that "the new fire-arm and ammunition will make a complete change in the system of actual warfare:" and that "he is daily more

* Colonel Raines.

and more fortified in this by the opinion of the oldest and most experienced officers of the French army." Their opinion is, that "heavy cavalry can now no longer be used with effect, and that artillery must be restricted to siege operations and the defence of fortified places." He further observes that "the improved musket-rifle (improperly called the *Minié*) can render cavalry and artillery useless at 900 yards distance."

With such opinons as these as a guide, any intelligent military man, acting as an adjutant, may easily adopt the exercise as now laid down in the "Light Infantry Manual," to the requirements of the *long range* rifle. He ought, however, to be careful, in making the necessary alterations, to conform as nearly as possible to such "Regulations" as he may well suppose will be issued from head quarters on the subject; so that one general system may be taught and adhered to.

CHAPTER XIII.

ON MILITARY EQUIPMENT.

Clothing.—Arms.—Accoutrements.

WITH reference to the colours best suited for the clothing of riflemen, I have often remarked that the dark green uniform, with black facings and black belts, appear to me, at 500 or 600 yards, as good a mark to shoot at as any, with the exception of very bright colours; and that, if indistinctness is a necessary qualification, it required some other colours, in facings and accoutrements, to break its dark, but plainly marked, appearance.

"Popular error," says Colonel Gawler, "ought to be corrected in regard to colours suitable for light infantry, by the plain matter of fact, that skirmishing is not in general a prowling, wolf-like proceeding, but sheer hard and open fighting; in which, indeed, the parties engaged make the best of any cover that presents itself, but in which also the flashes and smoke of firing alone presents marks for reply that no tint of uniform can conceal. In concealing cover, not the coat, but the

head dress and face are seen. It is a reasonable subject of doubt whether on open ground, at a distance of 600 or 800 yards, red, soiled by dust dirt, and drenching, does not mellow into a greyish purple, as little calculated to make the man who wears it a mark as blue, black, or dark green. Take away white epaulettes, white lace, and white belts, and the red jacket itself may still continue to be, with prudence and propriety, the leading star on land of England's high honour and prosperity."

The truth contained in these remarks must be evident to many of you; as you have had repeated opportunities, on ball-practice days, of seeing military men in all varieties of costume, and at all distances, up to 1200 yards. For the information of those, however, who have not had the same opportunities for observation, I may mention that, at 500 yards, red facings are not distinguishable by the naked eye; but at from 300 to 400 yards they are. At 200 yards, bright gilt buttons and gold lace on the uniforms are seen; but they are so blended together as to appear a patch of yellowish colour.

An "officer of the line," observes with regard to clothing for either militia or volunteers, that "it should combine in the highest degree suitableness and economy. Soldiers should be dressed in uniform; neither "*esprit de corps*," nor "*esprit militaire*," would be kept up without it. Doubtless men could fight as well in their *shooting jackets* (as a great authority suggests) or in their shirt sleeves on an emergency; but, for discipline and combined

movements, they should be dressed alike. We want no bright conspicuous colours—no brass—no plating—no pipeclay—no patent leather stocks—no close-fitting coats—no heavy knapsacks. A grey cloth tunic edged with red, with strong curb chain shoulder straps. Trowsers of the same material, with a cord or narrow stripe of red. A light helmet, not bright, but to match the dress as near as possible. Leather waistbelt, with two cartridge boxes to slide either before or behind at pleasure. These, with a good rifle and sword bayonet, would complete a dress, with all the requisites of usefulness, suitableness, and economy."

A green frock coat, not so dark as what is called "rifle-green," open at the throat, and double breasted, with two rows of buttons of a golden shaded bronze; crimson or red facings, edged with lace if desirable; with dark epaulettes, or bronze curb chains, on a red ground, for shoulder straps. Black trowsers, with or without a red stripe down the outside. A green cloth cap, and band, for undress; and, for full dress, a black felt helmet, with metal ornaments of the same colour as the buttons. These, I consider, could be made up into a handsome and serviceable uniform, at a moderate price; and for the sake of greater *variety* —for that after all, leaving out bright colours, is the great cause of indistinctness at a distance—the turn-over of the double breast might be of a different colour, or shade. The belts might also be of a golden bronze colour; as such would be more in keeping with the rest of the uniform, and quite

as handsome as black patent leather, which shines like steel when the sun is on it. When, by wear and tear, green cloth loses any of its original shade, it does not become so offensive to the eye, as the grey; which turns to an abominable sun-burnt brown colour.

In Chapter IX. I have, at considerable length, and I trust in a manner that may prove generally useful, entered into all the particulars connected with the rifle; but as some have recently recommended the use of double-barrelled rifles for volunteers, I shall here introduce a few remarks on that subject by another writer,* with whom I entirely agree. He observes that "as regards the employment of the highest elaborations of small fire-arms, volunteers possess considerable advantages over regular troops, a circumstance which, when taken into connexion with the excellent configuration of Britain as regards its geographical surface, viewed as a means of defence; as also, with the fact admitted by late writers on military tactics, that recent improvements in fire-arms add greatly to the powers of defence over those of offence; demonstrate to us that, of all nations, we are best adapted by nature to repel unjust invasion by volunteer resistance; and this conceded, it may be doubted whether we have not provided against the only justifiable case of war.

"What, then, should be the armament of a volunteer? This question let us proceed to answer.

* J. Scoffern, M.B., F.S.A., Professor of Chemistry.

"As to the infantry volunteer, he of course must have a rifle, as no one would think of arming himself with a common gun. Should it be double-barrelled? Generally speaking, we think not.

"In the first place, double-barrelled rifles, except those of exceedingly high price, are far less likely to be correct than single ones, owing to the difficulty of placing two barrels in exact parallelism, side by side. Then taking into consideration the danger of mistakes, during the heat of an engagement, of leaving one barrel unloaded, of doubling the charge, of touching the wrong trigger, added to the tendency created by the presence of a second barrel towards slovenly firing; all these circumstances considered, we certainly do not advocate the use of double-barrelled rifles."

With reference to appointments, &c., Colonel Gawler further remarks that "the weight of the ammunition and bayonet has hitherto, in regard to the infantry in general, been supported upon the shoulders, and that of the former concentrated on one point. It would appear very possible to divide the support between the shoulders and the waist, and to distribute it equally around. The thirty inches of space which, in general, surround the waist of the full-grown man, would allow of sixty ball cartridges, placed side by side perpendicularly in four flat well-made pouches, one on each side before, and the same behind. These might be attached to a waist-belt clasping in front, and supported, moreover, by a few stout buttons in the coat, and by a pair of very light belts, in the general form of common braces, crossing on the

back, but in front falling straight down from the shoulder without crossing, and terminating each in two points. The material for all these belts might be leather, and the colour, that very common tint, reddish brown, to assimilate with the coat."

"The advantage of this arrangment would be that, in addition to the weight being equalized, the soldier could, as he pleased, ease his shoulders by tightening the waist-belt, or ease the waist by loosing the clasp. He would be also free to throw wide open the coatee in oppressive weather, or in falling out on the line of march. Than this last, there could not perhaps be a greater relief to the practical soldier.

"In a campaign, a man might conveniently carry, in addition to this ammunition, thirty rounds of gunpowder in a stout well made flask, hung by a red strap over the shoulder, and a bag with thirty bullets, in greased patches, on the right side of his waist-belt, to balance the sword-bayonet, suspended from a frog on the left side. For long ranges, loading from the powder flask might be safe and convenient—the cartridges would serve for closer quarters."

CHAPTER XIV.

CONCLUSION.

A general knowledge and proficiency in the use of fire-arms—the best national defence.

ALTHOUGH there appears at present no danger of any aggression by an invasion of England, yet we cannot be too well prepared for such an event. Fortunately we have now time, I hope, to organize our resources, and to be better prepared than if the crisis had taken place at the time it was apprehended.

The most distinguished authorities, in every branch of the public service, have admitted the possibility of an enemy being able to land an imposing body of troops on some part of our coast; for, since the introduction of steam, "it is perfectly impossible for any navy, however active, vigorous, and numerous, to prevent altogether the landing of a hostile force;" and, in order to prevent the concentration of our regular forces to resist the main attack, "the landing would doubtless be attempted simultaneously at two or three different points; and those points, and his plan of attack

could not be definitely known until the enemy actually began to disembark his troops." It is also admitted that, if the attempt were made, "it would be with all the resources of the enemy. He would omit nothing which could in any way promote the success of the undertaking, and would be quite as confident of the result, as we would be of driving him back into the sea."

That the enemy would be ultimately compelled to an unconditional surrender, or be driven headlong into the sea, we will not allow ourselves to doubt; but, supposing that for want of a sufficient opposing force at the first, he was permitted to advance any distance into the interior; who shall tell of the havoc, that would be caused—the atrocities that would be perpetrated, before such a result could be accomplished.

At the commencement of the present century, when our country was threatened with invasion, and the powers of steam were unknown, the military force in England consisted of 184,000 regulars and militia, and no less than 400,000 volunteers; organized and ready to meet the enemy. Compared with this, what does our present force amount to? It is admitted by the authorities already alluded to, that "they do not believe that there is any danger if we are bold and *prepared to meet it;* but, that we are in danger if we are *not prepared.*" The question then is, are we properly prepared? or, are outward appearances sufficient to lull us into apathetic security? Every right-thinking man values the countless blessings of peace; but these cannot be long enjoyed, whilst

so little of the angelic nature exists in this sublunary scene, unless the possessors of these blessings demonstrate that they will not, *without strong opposition*, allow their privileges to be invaded.

With reference to the speedy acquirement of proficiency in the use of the *long range* rifle, and the essentials of good skirmishing, Colonel Gawler, remarks that "it is certainly of immense importance to the safety and prosperity of the nation that these subjects should be, *even now*, appreciated with practical closeness. Other civilized states are most active in investigation and in application. THE BRITISH SOLDIER STANDS CHEERFULLY READY AND WILLING TO DO HIS DUTY TO THE COUNTRY. IT IS FOR ENGLAND TO DO HER DUTY TO HERSELF AND TO THE SOLDIER."

From this designation he would by no means exclude any portion of the armed land defenders of the British Empire, so far as they might have claim to it by character and attainments; for he goes on to say, "Let the Volunteer Rifle Corps and Militias, acquire and maintain (as did the County Militias, during the late war, and as have done many of the Yeomanry Corps since that period), that drill and discipline, without which, in the hour of danger, men-at-arms are jests to their enemies, and pests to their friends; and they also may with justice be classed among the soldier-like guardians of their country."

The cant phrase with those who sneer at the idea of preparing for danger in the *time of peace*, is, that, in the event of an invasion taking place, "England would rise as one man;" but this is

absurd, for what would be the use of a *half armed undisciplined* rabble, such as could be got together on a sudden emergency. The great mass know no more about a gun than they do of the working of a steam engine, and, if intrusted with arms and formed into line, would be much more likely to cause destruction among their friends, than injury to their foes. Of the hundreds of thousands in England, few of them have ever handled a musket, and fewer still have ever fired a ball, or have even seen a ball-cartridge. Is this a population to be suddenly called into the field and opposed to the fire of veteran soldiers? Are these the intrepid hearts and skilful hands that are to "drive the enemy into the sea," or "find for every invader a bullet and a grave?"

The fact is, that England, as a nation, cannot spring at once full armed into the arena of the battle-field. "Peasants and burghers, however brave," says Mr. Macaulay, the historian, "are unable to stand their ground against veteran soldiers, whose whole life is a preparation for the day of battle; whose nerves have been braced by long familiarity with danger, and whose movements have all the precision of clock-work." Yet these men, who from their childhood have lived a life of peace and quietness at home, "buying and selling, or tilling their broad acres," possess the individual bravery and physical strength of disciplined troops, and only require to be trained and accustomed to the use of arms, in order to place England in a position to defy invasion; for, as Lord Palmerston once remarked, "there is no fortification like brave

men, armed, organized, and ready to meet an enemy; that is the best fortification, and such a fortification you will always find in the hearts and arms of Englishmen."

I may ask, is there a man, who, in the event of an invasion, would like to be unarmed and untrained? Is there one who would like to find himself unable to do anything to save his country and his relations from injury and dishonour? He might offer his services as a volunteer, but what would they be worth? could he even be sure of obtaining a weapon? Three or four hundred thousand of his countrymen would be equally clamorous to be supplied, and with as good a chance of success as himself; for arms are not manufactured in a week, or even in a month. But suppose him fortunate enough to obtain a rifle, what could he know about its use, or about acting in disciplined concert with others? for it takes a considerable time to make a soldier, whatever may be said to the contrary. Ought he, therefore, in the hour of his country's extremest danger, to be just *beginning* to learn the means of defending her? Or ought he, when she would be in need of his utmost skill and courage, to be taking his *first lessons* in drill?

In many parts of the continent of Europe and in America, the inhabitants are accustomed to the use of arms from their youth. Why should this not be so in England? The spirit of the Briton is not on the wane, nor will his prowess fail when the sound of the trumpet is heard. Our forefathers were celebrated for their skill in the use of the long-bow, why should not their descendants be as

celebrated in the use of the rifle? If the rifle were to become to England what the bow has been, a great step would be made towards the attainment of national security; for national defence in other countries has always been promoted by a national habit of rifle-shooting; they having all reaped the benefit of having been early habituated to the use of fire-arms.

In the Tyrol and Switzerland rifle-shooting is a popular amusement. All above the labouring class have their rifles, and they weekly repair in little bands to some chosen glen, which is their practice ground. Whole cantons meet on certain days of the year for the trial of their skill; twenty or thirty targets are set up, each with its knot of marksmen, and prizes reward the best shots. This is not only a popular but a useful amusement, for all these riflemen are enrolled in volunteer corps, and at stated times are drilled in military exercises, so as to be enabled to turn out when wanted, in the defence of their country. In the wars with revolutionary and Imperial France, the Tyrolese corps did signal service to their country. The Tyrolese war in 1809, is one of the brightest pages of history. Without assistance from regular troops, they for months maintained their fastnesses against the united power of Bavaria and France, when the rest of Europe lay prostrate before the armies of Napoleon. "This," says Sir A. Alison, the historian, "was in a great degree owing to their extraordinary perfection in the use of fire-arms."

We, compared with other countries, should admit of no inferiority; for if, in every town and

village of our native land, encouragement were given to the formation of Rifle Associations, and the use of the rifle, a spirit of emulation would be created which would eventually lead to our rivaling the celebrated rifle-men of the continent in their national amusement; for confidence in the rifle, and a knowledge of its powers, can only be obtained by constant observation and practice. If that were once obtained, it would impart a feeling of security to those who possess it, more especially if they were taught to feel that their safety, in a great measure, depended upon their own intelligence and individual prowess, and in the knowledge that the weapon they carried would, if properly used, bring an enemy to the ground at every shot. It would also impart a feeling of security to the aged and helpless inhabitants in whose neighbourhood such knowledge existed. There would then be no panics, no fear of invasion.

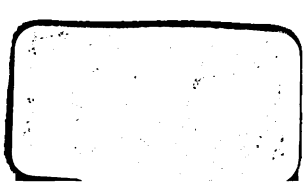
For Volunteers, the rifle service is not only the most effective and the best adapted, but by far the most pleasant. It unfits the citizen for no duty, while it imparts to him the satisfaction of feeling that, in his own person, he can join in the defence of his country, and her institutions. He will also become all the better soldier, if he can make his military training a delight; if he can make his practice more amusing than archery, or as exciting as the sports of the field; for "a useful thing is all the better for being a pleasure." Should this be so, he will try to perfect himself in shooting, he will take a pride in his rifle, and

become attached to his comrades. Far from sighing for the completion of his term of service, he will sigh when by advancing years he is compelled to lay aside his rifle, and bid adieu to those in whose company he had spent so many pleasant and profitable hours.

In conclusion, I again repeat that although there appears at present no signs of any aggression by an invasion of England, it does not become us to be apathetic on the subject. Deprived of the blessings of peace abroad, it is more than ever our duty to strengthen our defences at home; for we have been again compelled to send forth our warriors, both naval and military, to far distant shores, in a glorious cause however—not only to assert our own rights, but to assist others in maintaining theirs, fighting with them in the sacred cause of liberty—not led on by blind ambition, and the cursed desire of conquest, but assisting in circumscribing the mad career of a Despot—not wading through the blood of their fellow creatures in order to trample on their rights, but engaged in the merciful errand of delivering the helpless, the hopeless, and the oppressed.

These unlooked-for events declare to us that we know not what a day or an hour may bring forth. Sacred as our soil has been for centuries from the touch of an invader, we know not how long it may be spared the havoc and suffering that others endure. We, as a nation, know nothing of the horrors of war, and, therefore, are but too apt to think little about it, or to be sufficiently thankful that our lot has been cast in such a highly favoured land.

May He, in whom alone we can trust, still continue His favour and protection; and, should the day of trial come, enable us to repel every attempt that may be made to desecrate our homes—our happy land.

THE END.

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